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A Digest of the Practice of Pedodontics

Part Two of Three Parts

SAMUEL D. HARRIS, D.D.S., F.A.C.D.

Editor's Note:

In his brief preface, Sam wrote—"It is the intent of this publication to be a particularly concise, intensely practical compendium of thirty years of pedodontic practice."

Because Sam has crowded so very much into so little space in this book may I recommend that in order to gain the full value the reader carefully examine the specially prepared illustrations and those sections which possess the most significance for him?

The Comment Page is included with the expectation that each of us will use it to mail to the author his questions or comments, even though only a single word.

A.E.S.

CHAPTER VI

Dental Development

"Significant Differences . . ."

CONSIDERABLE difference exists between the dental apparatus of the young child, the adolescent, and the adult.

At forty days, buds of teeth are detectable in the embryo. From this time, the dietary care of the mother has particular significance to the proper unfolding of the primary tooth follicle. It is also of consequence to the permanent follicles which spring in part from them.

At birth the primary tooth formation is largely completed. (Figure 8) The first permanent molars have developed a thin occlusal enamel cap. By the time the child is one year old, half the enamel is deposited for the first molars and the incisors. By two and a half, the enamel is completely laid down for these teeth and in varying degree for the others of the permanent set.

Generally, the primary teeth are erupted by two and a half to three years of age. By six years of age, the permanent molars and incisors are ready for eruption. Permanent teeth replace primary teeth from now until the child is eleven or twelve years old and changes in the child's dental apparatus are many and significant.

The primary purpose of jaw growth is to provide adequate space for the permanent dentition. This is Nature's plan. It must be our aim to pursue a program as close to Nature's plan as possible.

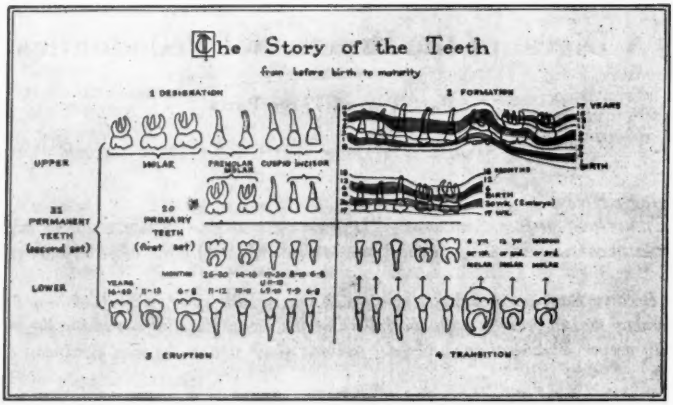

FIG. 8. Development and eruption

Teeth, therefore, should be maintained, repaired, straightened, extracted, etc. with this thought uppermost. This thinking must be basic in answering each question; such as: "Should I fill the tooth?—with what? Should I maintain the space? Should I straighten the teeth?—when? Should I extract the primary tooth for its permanent successor?—why or why not?"

At this point, permit me to point out that Nature ordinarily anticipates eruption with growth. When eruption takes place without adequate growth, function may be impaired. The abnormal condition should be corrected as soon as it is discovered. Thus, loss of a contact point, loss of part or all of a tooth, improper positioning of the teeth, etc.—each is a factor which may cause a disturbance in development. We have all seen how such impaired growth snowballs into dental complications and general trouble later in life—"for want of a nail. . . ."

CHAPTER VII

Structural Differences Between Permanent and Primary Teeth

"Butterfly—Caterpillar"

SOMETIMES we concentrate so hard on the sameness of the primary and the permanent teeth that we lose sight of their differences. These differences in structure, arrangement, and purpose are significant. (Figure 9) They dictate some precautions. They permit some mighty important liberties.

Why do these differences dictate precautions?—because primary teeth are

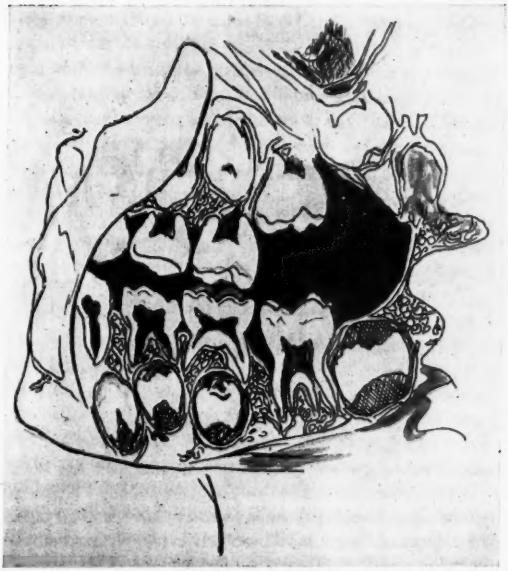

FIG. 9. Relation of permanent teeth to primary at six years of age

more marble-shaped having relatively larger pulps and more thinly woven dentine and enamel. One is broader, the other narrower than the permanent teeth which follow in their respective spaces. (Figure 10)

Trouble and more trouble is encountered in class II cavities in primary teeth if the accepted class II cavity preparation for permanent teeth is employed. We do not make class two box cavities as we would for permanent teeth; otherwise we would have devitalizations galore. We do not place a large filling in a primary tooth without an adequate base.

The size and shape of the primary teeth lead to trouble with the use of matrix holders and matrices. (I have evolved a system for dispensing with matrix holders.) We do not build contact points where contact points previously did not exist. Where contact points were present, we attempt to restore them just as they were; otherwise fibrous food-packs between the teeth are apt to lift our restorations and push the gingivae into a swollen, tender mass.

We do not make a space maintainer the mesio-distal dimension of the lower second primary molar when this is lost; otherwise we would do infinitely more harm than good. The primary tooth is fully 20% wider than its successor. Following its exfoliation, the first permanent molar grows forward into the narrowed space. The broad space maintainer would not permit this forward drift of the permanent first molar dooming it to disto-occlusion. Unattended this could throw the entire dentition into malocclusion. These are several of the precautions that should be observed in handling primary teeth.

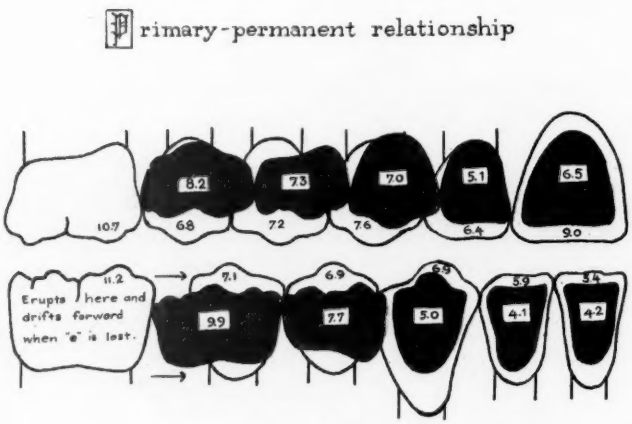

FIG. 10. Comparative size, shape and position of the permanent and the primary teeth

I spoke of benefits too, benefits derived from the morphology of primary teeth and their shorter term of function. These advantages immeasurably outweigh the disadvantages because the differences permit many short cuts. These tend to reduce discomfort in the preparation of cavities, in filling cavities, and in preserving these teeth and their function. They make it easier to do good dentistry for the child.

This will become more evident as we read the chapters that deal with cavity preparation, filling, extractions, space maintainers, etc.

It is important to have a full understanding of the physical differences in size and shape of the primary teeth correlated with a knowledge of their development and the approximate eruption time and length of service of each. Such knowledge leads to confidence and pleasure in pedodontic service.

CHAPTER VIII

Cavity Preparation in Primary Teeth

"Bell-shaped Crowns—Larger Pulps . . ."

PRIMARY teeth resemble permanent teeth. Yet their cavity preparation is quite different.

The length of time the service is expected to last permits some difference. The difference in structure and function of the primary teeth further molds any

decision. What to do and how to do it depends to some degree on the life expectancy of the particular tooth involved.

Let us begin with the primary incisors. The problem is generally with the upper incisors. Maintaining the mesiodistal diameter of these teeth is not important in the scheme of dental development; however cavities in these teeth are readily seen and consequently give parents concern.

Small cavities in the anterior or posterior primary teeth are treated very much as they are in the permanent set. Large cavities may require very different corrective management.

For illustration, if upper primary incisors have cavities that are deep and involve the proximo-incisal corner of the tooth, we do not fill them as we would the permanent set. We do not fill them because: first, such a restoration will endanger the pulp of the tooth; second, the chances are the filling will not hold; third, such a filling will be economically unsound; fourth, the operation will expose the child to unnecessary discomfort; and fifth, it is not in accordance with the best interests of the child. A more simple procedure, discing and shaping the proximal surfaces, is infinitely more satisfactory. As a result of growth, the upper incisors often normally have no contact with each other from four or five years of age. The increased loss of contact produced by the discing, therefore, is no detriment. It is a decided benefit in that discing permits a more ready flow of saliva and less tendency for adhesion of food debris to these proximal surfaces.

Discing (figure 11) is carried to where the enamel is supported by sound dentine. Should a small area of caries still remain in the center of the proximal surface, the caries is removed. The cavity then is prepared as a small class three cavity and filled with silicate.

The incisal edges of the affected primary teeth are evened at the same time that the proximal surfaces are trimmed. The proximo-incisal corners are rounded

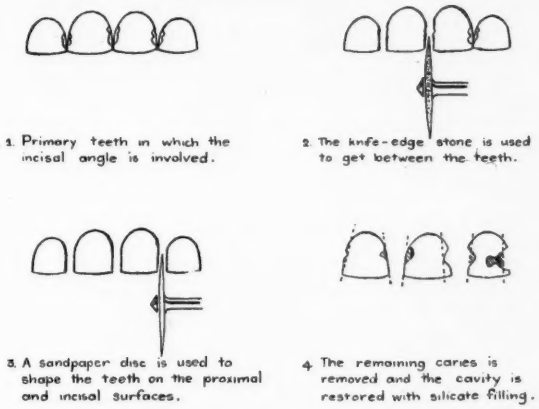
1. Primary teeth in which the incisal angle is involved.
2. The knife-edge stone is used to get between the teeth.
3. A sandpaper disc is used to shape the teeth on the proximal and incisal surfaces.
4. The remaining caries is removed and the cavity is restored with silicate filling.

FIG. 11. Discing and shaping

slightly to give an esthetic effect. A 7/8" carborundum paper disc is best used for the trimming and discing. The results are esthetic, effective, and lasting. They are accomplished with no special discomfort to the child. The cost to the parent is slight.

Large cavities in cuspids are treated much as in permanent teeth. Frequently a dovetail is used on the lingual to help anchor the filling.

Large one-surface cavities in the primary molars are treated like similar cavities in the permanent set. If the cavities involve two or several surfaces, the question of treatment takes on a different aspect.

The two-surface cavity preparation generally employed for permanent teeth has decided drawbacks for the primary set. Because of the proximity of the pulp of the primary teeth, the gingival-labial and lingual corners of the cavity preparation cannot be as sharp. Because the primary molars have less occlusal tooth depth protecting the pulp and because the teeth receive undue masticatory stresses as they exfoliate, the occlusal width of the cavity preparation must be relatively greater. This is particularly true at the marginal isthmus where fracture otherwise is apt to occur.

Another factor which often leads to embarrassment for the dentist is the tendency of the fragile primary tooth enamel to crack away if not soundly supported. A good filling thus exposed becomes leaky or falls out.

Expediency over the years has produced a simple cavity preparation which has been effective for me.

Figure 12 illustrates the simple armamentarium for cavity preparation. I employ no hand instruments but use the engine almost entirely. I use the thirty

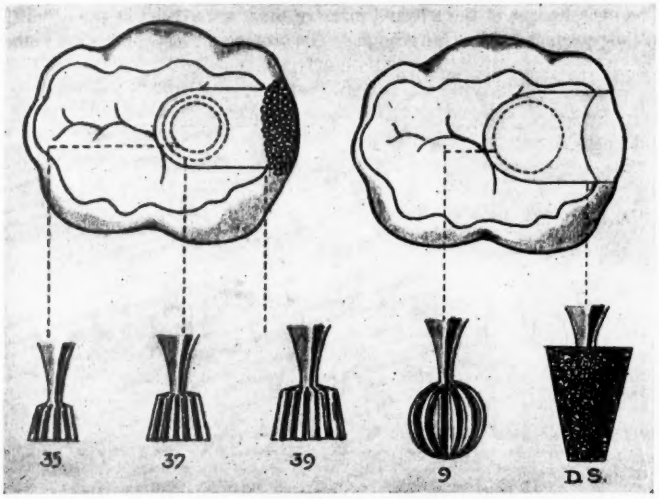

FIG. 12. Armamentarium for cavity preparation

five, thirty-seven, and thirty-nine burs in this order to establish an opening in the enamel. If using anesthesia, I may begin with the thirty-seven or even the thirty-nine. (May I say in passing that I use novocaine very frequently in the preparation of cavities in primary teeth? I shall discuss this in detail in a later chapter.) Then with a #8 or 9 round bur, I enlarge the occlusal and drop into the proximal to remove the caries. I complete the cavity form with a diamond stone. The large burs are carbide. Figure 13 shows the prepared cavities as they appear in the mouth.

FIG. 13. Mouth view of cavity preparations

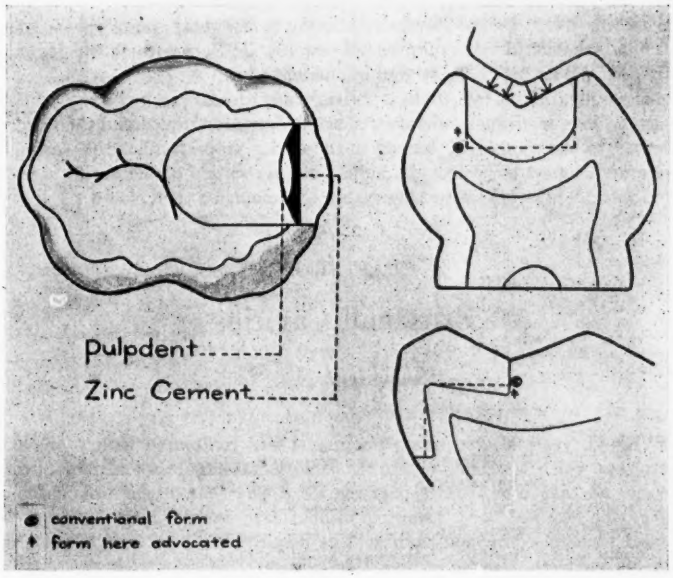

FIG. 14. Proximal view of cavity preparation

My experience has revealed that a cavity form with the occlusal floor of the cavity slightly concave as it is left by the #8 bur, works best (Figure 14). I believe that this is true in part because it allows for a larger bulk of amalgam. I also speculate that this cavity engineering-wise is more reasonable. It appears to produce a floor which is more at right angles to the occlusal stresses than is a flat floor.

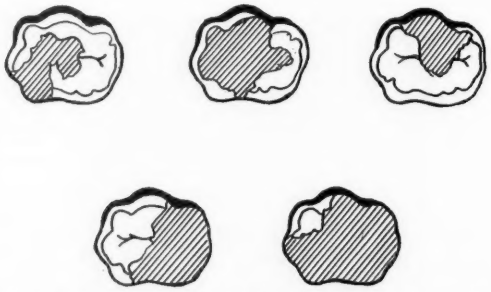

FIG. 15. Band restoration for multi-surface filling—primary teeth

For badly broken down primary molars, Dr. William Humphrey has designed steel crowns which are widely used. For the past twenty years I have used orthodontic bands for this purpose (Figure 15). These are more quickly and easily prepared as will be illustrated in chapter XI.

In those mouths where a tooth is so badly destroyed as to make an ordinary amalgam filling inadequate, the matrix band edges are thinned and the band is cemented to the tooth. The cement in the cavity proper, while still plastic, is leveled and shaped to protect the pulp. The preparation of the cavity is completed with an inverted cone or fissure bur and amalgam then placed.

CHAPTER IX

Proximal Cavities

"Incipient . . ."

SEVERAL years after entering practice, I was confronted with a grievous problem which I seem to encounter to an increasing degree in more recent practice. At that time, roentgenograms for a physician friend's daughter of twelve, who had just been dismissed without roentgenograms as "completed," revealed numerous proximal cavities. The majority of these were in posterior teeth. All the teeth were permanent. I immediately undertook correction.

The correction generally advocated is "cut out" or "keep under observation." Some of the cavities I repaired with MO, DO, or MOD fillings. Some, I explained to the parent, would be "watched." In six months, recheck with bite wings showed me the "watched" cavities required fillings. My watching had been no better a policy than watching an unchecked brush fire.

The outcome of this experience was that I thereafter filled all incipient proximal cavities as soon as these were observable in bitewing radiographs. Since interproximal cavities in large number are commonplace among youngsters of twelve to sixteen, I was forever sacrificing much sound tooth structure; moreover I was most unhappy about it.

To avoid cutting, I tried silver nitrate, first applying it on the outside of the tooth. Later I carried the silver nitrate through a small channel running from the proximal end of the occlusal pit to the inter-proximal caries inside the tooth contact. This plan salved my conscience for a while, but it did not solve the problem any better than the watchful waiting had done.

When I entered orthodontics, I discovered a more satisfactory solution. In separating teeth, I exposed the contact points. When this occurred, I found it comparatively easy to fill the teeth with simple spot fillings just as it is done on the mesial of a permanent first molar after the primary second molar is lost. This procedure appeared to have much promise; by study and experiment it has become an essential part of my practice.

The operative steps are simple. The procedure can be useful at all age periods. It has special merit with adolescent children.

The separators are of ordinary 22 and 18 gauge copper wire. The procedure including the ultimate filling generally takes two or three visits. The separation of several teeth can be included with other services at one visit. Each separation takes a moment, and the ultimate spot fillings take only a few minutes to insert.

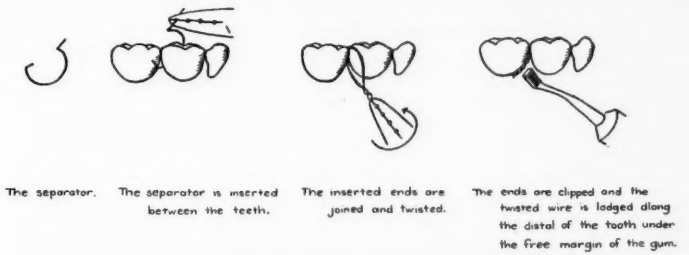
The separator.
The separator is inserted between the teeth.
The inserted ends are joined and twisted.
The ends are clipped and the twisted wire is lodged along the distal of the tooth under the free margin of the gum.

FIG. 16. Placing interproximal separating wire

This is the procedure: A 22 gauge wire, shaped as shown in Figure 16, is inserted, drawn firm, and twisted clockwise. It is then clipped two or three turns from the tooth, and the clipped end is bent distally and lodged under the free margin of the gum. At the next visit, the wire is untwisted counterclockwise. To remove it, the wire should be clipped at one end, (figure 17); then pulled out by

the other end. An 18 gauge wire is used at the second trip (these visits should be at least two weeks apart); and when this wire is removed, the tooth is ready for the simplified cavity preparation and filling. (Figure 18).

I have developed a special method for filling which I shall explain in the next chapter.

I do not utilize this class of filling where the mouth is highly susceptible to caries or where the caries has begun to spread under the dento-enamel junction. Observing these precautions, I find this procedure most satisfactory.

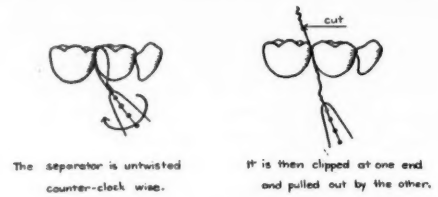

FIG. 17. Removing interproximal separating wire

CHAPTER X

Copper Amalgam

"Germicidal"

IN OUR discussion of filling materials, I am first mentioning copper amalgam for a purpose. This is not because it is the filling generally employed. A review of my records for twenty years shows that less than five per cent of all fillings inserted in my practice are copper amalgam.

I am mentioning it first in our discussion of filling materials because it has been the choice material in exceptional places and with exceptional patients. Its value in these special cases deserves emphasis.

Three such places are: one, in spot proximal cavities where extension for prevention is not employed; two, for posterior gingival cavities—particularly the disto-gingival of the most posterior teeth; and three, where teeth—particularly primary teeth—are being destroyed at an alarming rate by a soft, white, chalky type of caries.

In chapter IX I spoke of getting at incipient proximal caries through separation and then of filling with spot fillings. This procedure has its greatest value when cavities are just beginning, and it becomes less desirable as the caries progresses. It is seldom indicated when the caries has reached the dento-enamel junction and has begun to fan under the enamel.

A 7/8" Moore carborundum disc in a contra angle is used to sand down the carious surface. (Figure 18) This first step frequently eliminates all the caries, and no filling is necessary. The caries remaining is removed with a straight or

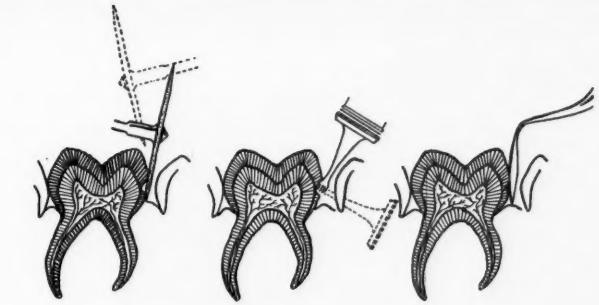
A sandpaper disc is used to reduce the size of the carious surface.
A small inverted bur is employed to clean out caries.
The filling is packed with a knife-edge plastic.

FIG. 18. Preparation and filling of incipient interproximal cavity

right angle 33½ inverted cone bur. The copper amalgam is now worked into the interproximal embrasure and packed into the cavity with a thin flat blade of the Ward carver type. The filling is smoothed with the shiny side of a lightning strip used very much like tape floss. Fillings are placed in approximating teeth at the same visit. The teeth drift back into contact within hours.

Copper amalgam lasts longer than silver amalgam in these cavities. It is usual in my practice to find such fillings as serviceable today as they were when first inserted several years ago.

I have never spoken of this type of filling as "permanent." At the outset, I hoped it would tide the patient over the difficult period at twelve and thirteen when these interproximal cavities appear so rapidly. It has worked out better than I had hoped; frequently it has lasted longer than more conveniently located fillings which I had labeled as "permanent" in my own mind.

Copper amalgam also serves well in gingival and posterior hard-to-get-at places. Since copper fillings are so much more tenacious, such fillings hold better in these inadequately prepared cavities than silver amalgam. Perhaps the reason for this is that copper amalgam is germicidal and produces a finer line of union with the surface margin of the cavity.

The third place where copper amalgam has been a "life saver" is in those mouths where the teeth appear to be "melting away" with rampant caries. The teeth are frequently coated with a scum that reminds one of the flour paste he used as a youngster for paper kites. Non-germicidal fillings become encircled with caries and fall out sometimes before the next periodic visit; therefore it is well nigh useless to repair these cavities with silver amalgam or cement. Copper amalgam not only protects better and holds better but actually seems to retard caries in this type of mouth.

I have been asked on occasion why this is so. I can not be sure that I know the answer; however the inhibitive tendency to caries that this germicidal material

possesses has struck my observation many times. Since none of what I am writing is "scientific," I pass some of these "observations" along for what they may be worth. Perhaps you, too, will find that copper amalgam has value. We may one day know just why.

CHAPTER XI

Filling Materials

"Silver Amalgam, the Prime Choice . . ."

COPPER amalgam discussed in the last chapter provides about 5% of my fillings. Synthetic porcelain furnishes another 7%. 3% are gold foil or inlays. Over 85% are silver amalgam.

Synthetic porcelain is the filling of choice for anterior restorations, whether these are in the permanent or in the primary teeth.

Only one or two observations need be made concerning the use of silicate in either. Primary and young permanent teeth constantly have their pulp necks "stuck out for trouble." Their loosely woven structures invite disaster. The newcomer to dental service for children can run into much grief in the form of "exposed pulp" by treating these teeth as he would treat teeth for the adult.

The young pulp has not had a chance to "pull its horns in." Since it is located close to the surface of the tooth, it invites exposure through caries, accident, or the bur.

Occasionally it is best to remove all the soft caries and leave just a small amount of the hyalin caries rather than risk an exposure. If the cavity is then filled with a "test filling"—pulp capping, and red copper cement—for 6 to 12 months, there is a good chance that secondary dentine will be laid down. When this "treatment" is removed, the small amount of caries remaining may be excised safely, the pulp capped, and a "permanent" filling inserted. This same procedure holds good for primary teeth. Secondary dentine does deposit in these teeth.

Silicates are used for cervical cavities in the incisors. A cement base is placed whenever this is technically feasible. The use of amalgam in the incisors, except in the lingual pit, is not desirable or necessary.

Gold foil is a filling of distinction. It is difficult to equal. Mat gold or gold foil is excellent for pit fillings in a "clean" mouth. Care should be taken in malleting gold foil into newly erupted teeth. Imprudent pounding may produce periodontitis and real trouble.

Gold inlays are infrequent. They are employed for permanent teeth and only where their use does not call for more cutting of tooth structure than is necessary with amalgam. Modified gold inlays and slice preparations have never been

satisfactory in my experience. In time there is too much tendency for the proximal of the inlay to spread away from the tooth under the stress of mastication.

Silver amalgam is the filling of choice with children four times out of five. It requires a conservative amount of tooth cutting and results in a filling with good edge strength. It does require a cement base every time this is possible. It also requires the use of a matrix for two-or-more-surface fillings. (You will recall that in a previous chapter I averred that I do not use matrix *holders*.)

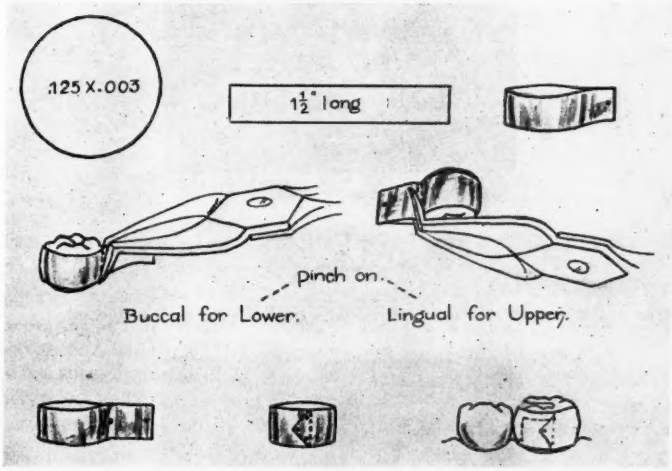

FIG. 19. Preparing a matrix—technical detail

A matrix is prepared by welding the ends of a one and one-half inch strip of band material. (Figure 19) This is pinched to hug the tooth closely. (Figure 20) The dental nurse now welds this in the laboratory (Figure 21); thus in a matter

FIG. 20. In the mouth

FIG. 21. Dental nurse welding matrix

of seconds we have a band that is "tailored to the tooth," stays put snugly, and requires no matrix holder. (Figure 22)

FIG. 22. Quickly tailored matrix on tooth

Over the years, I find myself using few instruments for packing and carving the amalgam. The simple armamentarium is shown (Figure 23). You will note that the packing instrument is round rather than flat at the end. This conforms better to the slightly concave occlusal floor used for our class-two cavity.

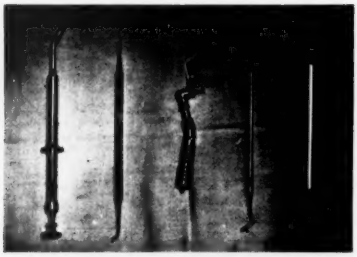

FIG. 23. Armamentarium for filling teeth

Once the cavity is filled, the amalgam is hammer-packed with the engine mallet, shaped with a Frahm, and carved in detail with the Ward carver. If a matrix has been used, the excess of amalgam over the edge of the band is removed and the band is "tipped off" with the end of the same Ward carver. It is tipped from the buccal on the lower teeth and from the lingual on the upper teeth.

Cement alone is never referred to as a filling, but rather as a treatment; however when a tooth is to be exfoliated shortly, cement may carry it along for the remainder of its brief term of service.

Cement, particularly red copper, is useful as a treatment. It appears to be relatively kind to the tooth and seems to encourage the deposition of secondary dentine. If at a future periodic visit I see red cement in a tooth, I know without

referring to my record, that it is a treatment and must be entirely removed. If I see white cement in a tooth, I know that no caries remains and that only the surface cement need be removed before placing the permanent filling.

I know that many of these filling recommendations are different from the orthodox techniques advocated to date. They are intended to take full advantage of the structural, functional, and shorter-life qualities inherent in primary teeth and have been of special value in my practice.

CHAPTER XII

Pulp Capping and Pulpotomy

"Avoid Treatment Pressure . . ."

IN PULP capping and pulpotomy, we face experiences with children quite different from those we encounter with adults. First, because the primary tooth's structure, function, and life expectancy are significantly different from those of the permanent tooth; second, because the technique of pulpotomy for primary teeth is different from that employed for permanent teeth.

When the pulp to be treated is vital, or partially so, I employ conductive or infiltrative anesthesia.

There was a time when I performed pulpotomies in primary teeth only under the rubber dam. Later, I replaced the dam with cotton rolls.

FIG. 24. Steps in pulpotomy and pulp chamber filling

The first step in pulpotomy is the complete removal of the occlusal roof of the pulp chamber with a 558 crosscut bur. (Figure 24) Then the pulp chamber tissue is excised with a sterile #8 round bur.

I do not enter the root canals. Originally, I attempted to ream all the tissues from the root canals of these primary teeth. This was difficult to do. When I

did accomplish it, I frequently stirred up an unfavorable reaction. Occasionally, a toothache was caused by my jabbing through the root ends. It seemed to occur also when I was certain that I had not gone through the root ends.

I found that removing the vital tissue from the root canals was not necessary in order to accomplish a good clinical result. The teeth still responded well; moreover x-ray check-ups at periodic intervals showed the root end pathology to be decreasing.

At present I do not enter the root canals of primary teeth even when the tooth is devital, but proceed as follows:

First I clean the pulp chamber and isolate the tooth with cotton rolls; then I dry it and insert Beechwood Creosote on a pledget of cotton. If the tooth has not been or definitely is not putrescent and is comfortable, I leave the Creosote in for a few minutes. If the tooth has been putrescent or does not seem to warrant so brief a use of the Beechwood Creosote, I leave the medicament in under stopping until the next visit when I fill the pulp chamber first with Gysi Paste or Pulpdent (Rower) and then with a thin layer of red copper cement.

Over the red cement I sometimes like to place a white cement for six months rather than an amalgam filling. I believe this is insurance for the dentist in the 10% of cases in which a tooth reacts unfavorably. Since the tooth is still under treatment and the parent has not made an investment in a permanent filling, she is not so disturbed if the tooth does respond unfavorably.

I use white cement over red cement even if I plan to fill the tooth immediately, for it is better mechanically. It insures against mastication pressure direct to the red cement which is just over the soft pulp chamber filling and thus not securely anchored.

Only teeth which are needed to preserve function and the proper mechanics of the dental arches, and teeth which are neither putrescent nor highly inflamed are selected for pulpotomy. Occasionally, the general health of the child and the economics of the family may influence the selection.

Pulp capping for young permanent teeth is successful in a large proportion of the cases undertaken. In fact, it is successful with rare exception. These teeth lend themselves admirably to pulp capping even when the exposures are quite large. My impression is that the proportion of success is much larger than with parallel conditions in the adult.

I have tried a number of pulp capping preparations, and have settled on Pulpdent (Rower) This is simply a proprietary preparation of Calcium Hydroxide in convenient form. It is easy to apply and effective. The paste is squeezed from the tube onto a slab and a bit is then placed directly over the exposure following isolation and drying of the tooth. Zinc cement is flowed over the Pulpdent and the permanent filling inserted.

The technique of pulpotomy for permanent teeth is much the same as for primary teeth with these important differences. Anesthesia, conductive or infiltrative, is always used; and the pulpotomy is performed as aseptically as pos-

sible. The tooth selected for treatment must have sufficient vitality so that the operator is certain that the tissue remaining in the root end is vital and has a favorable chance of remaining vital.

Beechwood Creosote is inserted for several minutes, and a bland paste like Pulpdent is employed as the pulp chamber filling. The pulp chamber filling is covered with red cement, and the remainder of the tooth cavity is filled with white cement. This treatment is left in the tooth for six months, or the tooth may be filled immediately.

It is important to emphasize that in pulp capping and pulpotomy no pressure must be exerted in placing the treatment or cement. The point cannot be hammered home too hard. In using capping material or Beechwood Creosote, we avoid pressure!

Your Comment Page

1. Questions:

2. Comments:

3. Practice Hints:

FROM:

Please mail to: Dr. Sam Harris, 2312 Broderick Tower, Detroit 26, Michigan

Child Management*

GEORGE E. WATERMAN, D.D.S.†

I think we will all agree that if in the past, more dentists had been willing to provide treatment for children, we would not have nearly so tremendous a dental health problem as that which confronts us today . . . in short, the average American would probably *not* be losing half his teeth by the age of 40. Naturally, we cannot attribute the low level of dental health in this country *solely* to the fact that many dentists are indifferent to, or even prejudiced against, dentistry for children. However, there can be no doubt that lack of adequate dental care for children—be it due to parental neglect or indifference within the dental profession—is a problem that must be solved before we can expect any real improvement in dental health among adults.

To underline the need for more dentistry for children, I should like to review just briefly some of the findings of a dental care study program completed in December 1951 in Richmond, Indiana. The idea was to provide four consecutive rounds of *complete* dental treatment—except orthodontics—for an entire school population, five through 16 years of age. Eighty-seven per cent of the children—about five thousand of them—got this treatment over a five-year period.

I might point out here that Richmond is a typical midwestern city of about 40,000 people with moderate-to-high incomes. Our findings can be considered fairly representative of dental conditions among the children of any American community of comparable size and economic level.

Here, in a nutshell, is what we found when we went into Richmond:

Seventy-five per cent of the children had experienced some degree of caries in their permanent teeth. Specifically, there was a total of approximately 18,000 decayed permanent teeth, involving 30,000 surfaces. By way of example, the average child had 11.47 decayed teeth by the time he reached the age of 15.

As for the primary teeth, more than 34 per cent of those examined were found to be carious. The average seven-year-old had 13.58 primary teeth present in his mouth . . . 5.11 or 38 per cent of them were decayed.

Now, the point I want to make is that less than *17 per cent* of the youngsters had had any fillings in their permanent teeth . . . less than *10 per cent* had had any fillings in their primary dentition.

If these findings are representative of child dental health generally—and we can assume that they are—then, obviously, they present a terrific challenge to the dental profession. Why is it, though, that so few dentists have *accepted* the challenge? The reasons are legion . . . but perhaps the most important is an attitude common among dentists who have never actually practiced pediodontics. Their feeling is that the practice of dentistry for children is too difficult . . . that youngsters simply won't behave in a dental office . . . that adult patients are easier and more pleasant to work with.

* Presented at the Post-Graduate Clinic, District of Columbia Dental Society, March 18, 1953.

† Chief Dental Officer, U. S. Coast Guard.

We who took part in the Richmond study don't go along with this argument at all. After spending five years treating *thousands* of children of all ages, *we* concluded that children's dentistry does *not have* to be difficult . . . in fact, it can be one of most pleasant and most satisfying experiences of the profession.

The Richmond project was a revelation in that respect. The children came to our clinics willingly and they behaved themselves well after they got there. Behavior problems were extremely rare.

I would like to discuss some of the conditions that seem to have contributed to this nearly ideal situation . . . conditions which can be adapted to any dental clinic or private practice. We can divide them into six general categories:

First, *preliminary indoctrination* . . . in other words, tell the child *why* he is going to the dentist . . . give him a reason for *wanting* to go. Each time we entered a school in Richmond, the children had been told about it beforehand at school assemblies . . . had been told why we were coming, why good dental health is important, and so on. The importance of well-timed toothbrushing, proper diet, and regular visits to the family dentist were all stressed during these assembly meetings. The indoctrination method is more effective, of course, with older children, but even five and six-year-olds are able to grasp *some* of the whys and wherefores of oral hygiene and dental treatment. Obviously the method cannot be used on a group basis in private practice, but there is no reason to doubt that the individual approach would be equally effective.

Second, *suitable clinic environment* . . . by this I mean an environment designed to let the child see for himself that he has nothing to fear from the dentist. An open type of office or clinic is ideal for this. In a multiple-chair office, there should be at least two chairs to a room so that each child waiting his turn can watch the dentist treating the patient before him. This eliminates the situation where a child about to be ushered into strange surroundings conjures up terrifying visions of what may be waiting for him behind the closed office door.

The third on my list of conditions can be referred to simply as *proper timing*. This is particularly important with younger children—through age seven—who are more subject to fatigue and attendant irritability. In Richmond, we found it wise to schedule appointments for younger children in the early morning or early afternoon when they were less likely to be tired. The *length* of the treatment period is important, too . . . in most cases, 30 minutes should be the limit for five and six-year-olds. Good timing is really essential in scheduling *types* of treatment. Some dentists believe in "getting the worst over with right in the beginning." However, we found that, contrary to this theory, we got our best results by starting off with the simpler operative procedures. Thus, the child's introduction to dentistry usually involved only prophylaxis, topical fluoride application, and perhaps a simple occlusal filling if indicated. Extractions and extensive reparative services were usually postponed until a later date. When both types of treatment were indicated in the same quadrant we tried to complete them at the same sitting.

Fourth and probably the most important prerequisite to effective dentistry for children is what might be called the *personal approach*. A dentist can act disinterested and businesslike with adult patients—some patients prefer it that way—but it doesn't work with children. Instinctively, children demand that the

dentist be their *friend* before they will submit to his control . . . and complete control of the patient is absolutely essential in dentistry for children.

There are, of course, no set rules for managing children in a dental office. But we *can* say definitely that the dentist's approach to each child must be founded on a combination of patience, firmness, and common sense psychology. The dentist must really *like* children, and he must have a keen awareness of the importance of giving dental care to younger age groups. If he feels otherwise —if his attitude is not really genuine— his patient will sense it . . . will lose confidence in him . . . and give him only grudging cooperation, or in some cases no cooperation at all.

Based on our experiences in Richmond, here are some of the pointers I would like to give a young dentist just starting out in the practice of dentistry for children:

To begin with, remember that the child's *first* experience in your office is extremely important since it may serve to prejudice him either for or against dentistry for many years to come. To many youngsters, their first visit to a dentist is synonymous with having a tooth "pulled". So, if there is no extraction indicated, let the patient know about it right away. Often, the child is so fearful of extraction that if you explain that you are going to clean out the decay in a tooth and fill it in order to avoid extraction, he will immediately become interested and cooperative. Thus, the "battle" is practically won, inasmuch as one successful treatment period usually assures continued success.

Another important point is to know your patient's first and last names. Little girls like to be addressed as "Miss So and So". Both girls and boys object to such terms as "honey", "darling", and "sonny". They don't like baby talk either.

Always try to notice and compliment the child on any new articles of clothing or jewelry.

Express concern for his physical comfort, and talk to him from a seated position so that your eyes are on the same level as his.

Don't perform tricks for your patient . . . riding him up and down in the dental chair or fashioning airplanes from cotton rolls. Such antics are time-consuming and contribute little or nothing toward good behavior.

Have a definite treatment routine planned for each patient and give him a running account of what you are doing. Don't hesitate to use the words "pain" and "hurt".

Praise the child sincerely when he is well-behaved or cooperative.

Don't hesitate to be firm and uncompromising with an *un*-cooperative patient. Sometimes the so-called "towel" method must be used as a last resort. However, above all, do not lose your temper, because any outward show of anger or disgust on your part will only aggravate the situation. I might point out that severe disciplinary measures were rarely necessary in our work in Richmond.

The fifth in my set of conditions favorable to dentistry for children is the *use of dental assistants*. During the Richmond study each dentist had the full-time services of a chairside assistant and the half-time help of a second, roving assistant. This system reduced his ordinary work load by at least one half, enabling him to give more service without sacrificing quality. Not only did the effective use of assistants enable the dentist to treat more patients, but it

also was an important factor in eliminating behavior problems. Actually, a capable and sympathetic assistant can often accomplish more than the dentist himself to assure an easy relationship between him and his patient. For one thing, it is usually the assistant who introduces the child to clinical environment for the first time . . . acting as a go-between from reception room to dentist. If she is well-trained technically . . . if she likes children . . . if she knows how to win their confidence . . . her services are indispensable to the practice of dentistry for children.

The sixth and final set of conditions I want to mention concerns the kind of *professional technics and methods* that are particularly well-suited to the treatment of children.

All of our technics and methods should be chosen with the idea that *speed* is of the essence . . . that each child is entitled to get complete treatment as quickly as possible. In Richmond, for example, we always tried to complete operative treatment in at least one quadrant during each sitting. It was also common practice to place approximating compound alloy fillings during one sitting . . . a practice which, as far as we know, had no ill effects.

Pain-reducing technics are probably even more important in dentistry for children than in the treatment of adults. In our study project, we used local anesthesia for about 80 per cent of the permanent teeth filled. Very few children objected to its use . . . in fact, the majority asked for it after the first experience. Anesthesia is seldom necessary for cavity preparation in the primary teeth. But when it is used, try to avoid the mandibular block, particularly in *very* young children. Avoid the more painful lingual injection . . . always use a sharp, fine-gauge needle . . . and remember, a small amount of well-placed anesthetic solution is less painful and just as effective as a large quantity.

Another technic that speeds up treatment is cavity preparation under water. It's faster . . . helps protect the pulp of the tooth from excessive heat generated by the revolving bur or stone . . . and it prolongs the life of burs and stones. Other "musts" in children's dentistry are the use of diamond stones, carbide steel burs, sharp cutting instruments, and double-end instruments.

The multiple-chair procedure is important, too. It enables the operator to move back and forth between patients . . . reduce his nonproductive time to a minimum . . . and provides brief periods of relaxation for a patient undergoing extensive treatment.

I can sum up my discussion by saying that one of the main objectives of the Richmond project was to study the most effective procedures for use in dentistry for children . . . to develop new methods and perfect the old ones . . . methods aimed at providing the highest-quality dental treatment for the greatest number of children and making this treatment as pleasant and painless as possible for both patient and dentist.

The best evidence I can give of our success is that each dentist who took part in the project now swears by the procedures I have outlined to you today. And by way of postscript, I might add that each of these men came away from Richmond convinced that the practice of dentistry for children can be a truly happy and rewarding experience . . . an experience well worth any extra effort it may entail.

Around the Country

A.S.D.C. President, *Hugh Keenan*, Corning, New York, has added another duty to his schedule—and another feather to his cap—by recently being appointed Supervisor of Dental Hygiene for the City of Corning School District.

* * *

Charles Sweet, Sr. and son, *Charles Sweet*, Jr. have recently authored a series of articles for *Revista de la Asociation Dental Mexicani*. These articles, written in Spanish, deal with the handling of pedodontic cases, with emphasis on pulpal involvements.

* * *

Earl Shepard and *Leo Lundergan*, St. Louis, both have recently become Diplomates of the American Board of Orthodontics. Earl also recently was essayist before the St. Louis Dental Society. "Orthodontic Treatment for Adults" was his subject.

One of the nicest persons we know, *Florence Rich*, St. Louis, is no longer in the active practice of dentistry for children, due to a serious illness in her family. We in the Missouri Unit hope she will continue to attend our meetings, scientific and social; for it won't seem right without her.

* * *

Wm. W. McGrannahan, Kansas City, has recently been elected secretary-treasurer of the Kansas City District Dental Society.

* * *

E. Warner Douglas, Kansas City, announces the removal of his offices to 237 W. 47th St. He continues to limit his practice to dentistry for children.

Table clinics on dentistry for children were given at the Annual Meeting of the Missouri State Dental Association in St. Louis in June by *Roger L. Parrott*, St. Louis, *James Jolly*, St. Charles, *Edward Hodgson*, St. Louis, and *William Stocker*, Springfield.

* * *

Fred Fabric, St. Louis, announces the removal of his office to 101 S. Meremac St., St. Louis 5, Missouri, for the practice of orthodontics.

* * *

The many friends of *Miss Hilda Rankin*, librarian of the School of Dentistry at the University of Michigan, will be saddened to learn of her death early in July. We will always remember her patient and capable assistance to us and every other student, undergraduate, post-graduate or graduate, whose assignments included library work. *Miss Rankin* will be sorely missed by all who knew her.

* * *

Allen O. Gruebbel, Kansas City, spoke on "The Scientific Aspect of the Fluoridation of Water" before the 83rd annual meeting of the Kansas State Dental Association in May. Table clinics were given on various aspects of dentistry for children by *Willis Wollman*, Moundridge, Kansas, *Wayne Rose*, Wichita, and *F. N. Habersbach*, St. Francis, Kansas.

* * *

Leonard Rosen, St. Louis, has returned from his two year sojourn with Uncle Sam and is back in St. Louis practicing dentistry for children. Welcome home, Lennie!

Norman Olsen, Kansas City, and some of the other men in the Kansas City area interested in dentistry for children have been organizing a subsidiary group of the Missouri Unit. A particularly good idea in this state with the two largest cities separated by the entire width of the state.

* * *

Ralph Ireland, Lincoln, spoke on "Recent Advances in Operative Dentistry for Children" at the 1954 Annual Scientific Meeting of the California State Dental Association in April. *Charles Sweet*, Jr. and *Bernard A. Smith* (They're from California!) also appeared on the program.

* * *

In connection with Omaha's Centennial Celebration this year, the Omaha District Dental Society is sponsoring a Centennial Dental Derby to locate the three most perfect dental smiles in the area. The three groups to be judged will include a pre-school group, a high school group, and an adult or post-high-school group. It is hoped that this contest will help illustrate to lay people how unusual it is to find a perfect dentition—and thus point up the importance of early and regular dental care.

* * *

D. D. Gustafson, Omaha, is a recent graduate of the University of Nebraska, College of Dentistry, who limits his practice to dentistry for children at 6104½ Military Avenue. He recently authored a very fine article on thumbsucking for the *Chronicle* of the Omaha District Dental Society.

* * *

Benton Kutler, Omaha, has returned after his stint in the service and is back in practice in his newly decorated offices in the Brandeis Theatre Bldg.

Earl Lampshire, Lincoln, reported to San Diego for active duty with the Navy on May 17. Lots of luck to you—and may you return to your old stamping grounds very soon.

* * *

Sidney Kohn, Jersey City, was essayist before the 89th Annual Meeting of the Connecticut State Dental Association on June 2. His subject: "Applied Dentistry for Children".

* * *

Dean *John Brauer*, Chapel Hill, N. Carolina, addressed the New Jersey Society of Dentistry for Children in Atlantic City, on May 6.

* *

William E. Brown, Ann Arbor, Michigan, presented "The Management of Traumatized Young Teeth" at the annual meeting of the Tennessee State Dental Association on May 9, in Chattanooga.

* * *

Solomon N. Rosenstein, New York, was an essayist at the 84th Annual Meeting of the New Jersey State Dental Society in early May. His subject: "Consideration of Various Phases of Dentistry for Children".

* * *

Walter McFall, Asheville, N. Carolina, appeared on the program of the Kentucky State Dental Meeting in Louisville in April. He spoke on "Everyday Dentistry for Children". *Lyman Wagers*, Lexington, gave a table clinic on "Dentistry for Children" and *E. Gerald Tasch*, Louisville, presented one on "Fractured Anteriors".

* * *

Sidney B. Finn, Birmingham, Alabama, presented a paper on "Child Management" to the Alabama unit of the A.S.D.C. during the 85th annual meeting of the Alabama Dental Association in Biloxi, April 26.

William M. Jarrett, Charleston, W. Virginia, announces the association of *C. H. Hopkins* for the practice of orthodontics.

Ken Easlick sent us the photograph above, of pretty Rachie Criner, along with the following little story: "Some five years ago, Dr. Carlos Criner of Havana, (one of the foremost educators, writer and proponent of good dentistry for children in Cuba) toured the United States with his family, visiting many dental schools and pedodontists. Language difficulties during the tour were at a minimum, due to the presence of Rachie, then in her early teens and cute as a button!

A short time ago I received a picture of Rachie Criner as she appeared at her recent graduation, along with an interesting letter which told me she was now in her first year of dentistry and liking it very much.

I'm sure the many friends of Carlos Criner in the A.S.D.C. will be pleased to learn of Rachie's progress in schooling (not to mention her pulchritude!), and will appreciate Carlos' justifiable pride".

* * *

Thanks to *Naomi Dunn*, New Britain, Connecticut, for sending on a program of the Third Annual Spring Conference of the Connecticut Society of Dentistry for Children on April 28. *Samuel Ritvo*, M.D., of Yale University School of Medicine spoke on "Psychiatric Aspects of Fear in Children". *Charles Boyers*, of the Harvard School of Dental Medicine, presented "Oral Pathology in Pedodontics". Table clinics were given by *Phillip Levin*, *Elias Fass*, *Norman Feitelson* and *Mark Wallach* on other aspects of dentistry for children.

* * *

Paul Sydow of Framingham, Mass. has finally been able to gather enough courage to "pop the question"! Recently the Boston papers told of his engagement to *Shirley Ann Green* of Dedham, Mass., with the wedding planned for October.

Shirley is a dental hygienist and we suspect *Paul* plans to incorporate her into his office routine as well as to make her his general manager!!

* * *

The annual meeting of the Dental Guidance Council for Cerebral Palsy will be held at the Hotel Statler, New York City on Sunday, October 31, 1954 at 10 A.M.

Those taking part in a panel discussion will be:

STANLEY R. SPIRO, D.D.S., *Chairman*
President, Dental Guidance Council for Cerebral Palsy, Chief of Anesthesiology, Department of Dentistry, Jewish Sanitarium and Hospital for Chronic Diseases, Brooklyn, New York

LOUIS M. DI CARLO, Ph.D.
Professor of Audiology, Speech Pathology, and Education, Syracuse University

JOHN K. DUFFY, Ph.D.
Associate Professor of Speech, Brooklyn College
SOLOMON N. ROSENSTEIN, D.D.S.
Professor of Dentistry and Director of Pediatric Dental Cerebral Palsy Clinic, School of Dental and Oral Surgery, Columbia University
S. SVERDLIK, M.D.
Chief of Department of Physical Medicine and Rehabilitation, St. Vincent's Hospital, New York, New York

This symposium should be of interest to the dental, medical and allied professions. Further information may be procured at the offices of the Dental Guidance Council for Cerebral Palsy at 47 West 57 Street, New York 19, New York, PLaza 3-3005.

* * *

Well, Uncle Sam finally decided he needed *Larry Teutsch* in his Navy! On June 1st *Laren* turned over his practice to *Donald Stormberg*, who will carry on with *Jim Huerter*, while *Laren* is in the Service. At present, *Laren* is holding forth at El Toro, Santa Ana, California, and is enjoying his new experience. Good luck and a safe return to you, fella!

* * *

It's Capt. and Mrs. *Robert L. Hamilton* now, although the Bishop pronounced them Dr. and Mrs. only a few days before at their beautiful June wedding. *Bob* is leaving his busy pedodontic practice in Inglewood, Calif. to join the Air Force in August.

* * *

Irving Rubel is opening his own office in Los Angeles after 5 years of association with one of the pioneers in pedodontics . . . *Ben Rabinowitch.*

* * *

"Dutch" Snyder had open-house Mar. 3, 1954 for all of the Conferees at the Third Annual Post Graduate Conference. There sure were a lot of drooling pedodontists looking his masterpiece over. I'm sure everyone picked up some good pointers on building and planning from their visit to the office. Good Luck!

ERRATUM

Article III, Section 5 of the By-Laws of the Constitution of the American Society of Dentistry for Children as amended September 1953, should read as follows:

"All nominees for the office of president, president-elect, *vice-president*, and secretary-treasurer must have served at least one term as a member of the Executive Council or as a member of a standing committee of the American Society of Dentistry for Children prior to their nomination."

Root Resorption in the Permanent Teeth of Young Adults*

MAURY MASSLER, D.D.S., M.S. AND J. GEORGES PERREAULT, D.D.S.

It has often been assumed that root resorption in permanent teeth is not normal and in fact is evidence of a pathologic state related to periapical infection, faulty root canal therapy, systemic diseases and occlusal trauma.

In 1927 and 1929 Ketcham first indicated that root resorption does occur to a slight degree in permanent teeth under perfectly normal conditions. Since that time many investigators (Rudolph, 1936 and 1940; Becks, 1936 and 1942; Hemley, 1941; Henry and Weinmann, 1951; and Malone, 1951) have shown that the roots of permanent teeth are subject to a certain amount of resorption during their life span. This amount is much less than that experienced by the primary teeth and is generally limited to the apical fifth of the root. Malone, 1951, referred to this common condition as "idiopathic" root resorption.

Purpose of this Study. The present investigation was designed to compare the frequency and the degree of idiopathic root resorption of permanent teeth in males and females as revealed by routine full-mouth roentgenograms. The age range in the females was 18 to 25 years; in the males, 20 to 25 years. The number of teeth examined was 2,730 in 151 females and 3,114 in 150 males.

Method of Examination. Each film was examined carefully by transmitted light, using a loupe with a 3 × magnification. In every instance, each tooth root was examined in *two films* and therefore from two different angulations. Where only one film of a particular tooth root was available and the presence or absence of resorption was questionable, the film was discarded.

Criteria of Classification. The method employed to assess the amount of root resorption is the same as the one used by Malone in 1951, as follows:

Degree or Type of Resorption	*Description*
0	No evidence of resorption.
?	Questionable resorption. Root outline intact but there appear to be minute areas of spotty resorption. Lamina dura is interrupted and the periodontal membrane widened in the periapical area.
1+	Root apex definitely blunted and resorbed for at least 1 mm. to about 2 mm. Lamina dura interrupted and periodontal membrane widened about the periapical area of the tooth.
2+	Resorption of root apex for at least 2 mm. to 4 mm. Lamina dura interrupted and periodontal membrane widened.
3+	Resorption of root 4 mm. to half of the root length.
4+	More than half of the root length resorbed.
#5	Root resorption related to periapical infection, root canal therapy, cysts, etc. (degree not assessed).

See also figure 5.

Statistical Analysis. The average number of teeth showing idiopathic root resorption was computed for each group by adding the total number of teeth showing such resorptions (1+, 2+, 3+

* Presented before the American Academy of Pedodontics June 25, 1953.

and 4+) and dividing this sum by the total number of persons examined.

The index of root resorption was computed for each individual by adding the figures indicating the amount of idiopathic root resorption (1+, 2+, 3+ and 4+) and dividing this sum by the number of teeth so affected in each person. Teeth scored as zero, questionable or #5 were omitted from this computation. The index for each group was derived by adding the individual indices and dividing by the total number of persons examined.

The significance of the differences found between the means of the male and female groups were tested by the "t" test according to the formula:

$$t = \frac{M_1 - M_2}{s} \sqrt{\frac{n_1 \times n_2}{n_1 + n_2}}$$

M_1 and M_2 are the respective averages; s the pooled standard deviation and n_1 and n_2 are the number of individuals in the two samples.

The level of confidence was placed at 1% (less than one chance out of 100 that the difference is due to chance).

FINDINGS

One hundred per cent of the persons whose dental roentgenograms were examined showed evidence of some degree of root resorption in four or more permanent teeth (figure 1). Eighty-one and eight-tenths per cent of the teeth in the males and 90.9% of the teeth in the females showed some evidence of root resorptions. In only 0.9% of the teeth in the females and in 2.7% of the teeth in the males was there any evidence as to the cause of the root resorptions such as root canal therapy and periapical infections (figure 2A). In the remaining teeth, no cause for the resorptions was evident. Such instances were therefore referred to as idiopathic root resorption.

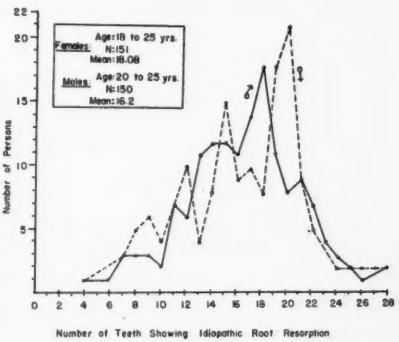
Females: Age:18 to 25 yrs. N:151 Mean:18.08
Males: Age:20 to 25 yrs. N:150 Mean:16.2
Number of Persons
Number of Teeth Showing Idiopathic Root Resorption

FIG. 1. Frequency distribution of males and females with different numbers of teeth showing idiopathic root resorption.

The female group showed an average of 18.08 teeth resorbed per person while there was an average of 16.2 teeth resorbed in this group of males (figure 1). This difference was statistically significant ($t = 3.48$). There was less than one chance in a thousand that this difference was due to chance ($P = 0.1\%$).

Figure 2A shows the frequency distribution in the number of teeth showing different amounts of root resorptions. Analysis revealed that the females had more teeth resorbed than did the males (90.9% vs. 81.8%) and in the female group there were more teeth which were severely resorbed (2+, 3+ and 4+) than in the males. The males, conversely had a larger number of teeth which showed slight (1+), questionable and no resorptions (figure 2B). The index of root resorption was 1.5 in the female group and 1.27 in the males (figure 3). This difference was statistically highly significant ($t = 8.27$).

From the above it can be stated that in the females there was an average

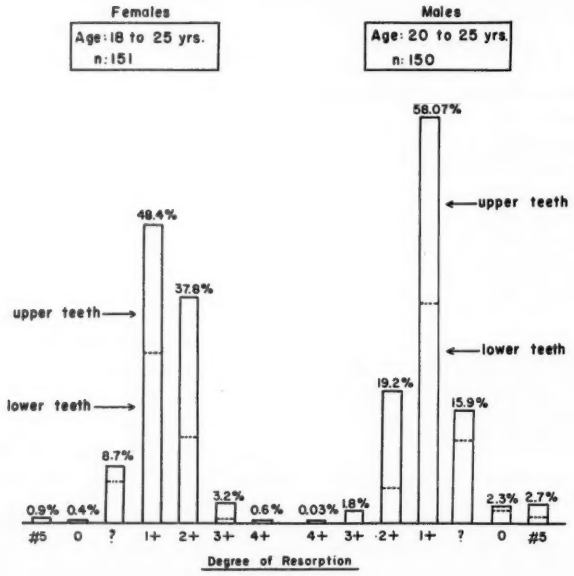

FIGURE 2A. Frequency distribution of different degrees of root resorption in males and females. Note the greater number of females with 2+, 3+ and 4+ root resorption and the greater number of males with ? and 1+ resorption.

number of 18.08 teeth which showed root resorption. The index of 1.5 indicates that one could expect (in the "average" female) 9 teeth resorbed to a mild degree (1+) and 9 teeth resorbed to a moderate degree (2+). In the males, one could expect 16 teeth to show root resorption. The index of 1.27 indicates that in the "average" male 12 teeth would show mild (1+) resorptions and 4 teeth would show moderate (2+) resorptions.

Figure 4 shows that bilateral symmetry was very apparent in the pattern of root resorption in both the male and female groups. However, the maxillary teeth showed more resorptions than did the mandibular teeth (figure 2A bottom and figure 4).

The order of susceptibility of the teeth to root resorption in this study was not consistent with the previous studies. We found the upper bicuspids to be the most susceptible and the lower incisors and molars the least susceptible to root resorption (table 1). Almost all earlier studies (Becks, 1936; Rudolph, 1940; Hemley, 1941; and Malone, 1951) found

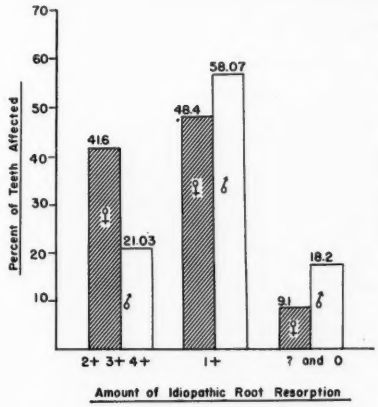

FIG. 2B. Comparison between males and females as to percent of teeth affected by different degrees of idiopathic root resorption.

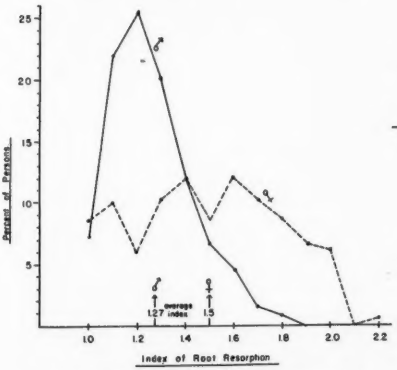

FIG. 3. Graph showing the frequency distribution of the index of root resorption in males and females.

the lower incisors to be the most susceptible to root resorption.

DISCUSSION

Knowledge of the resorption potential of the permanent tooth roots is of great importance to the orthodontist since orthodontic tooth movement is a strong stimulus to root resorption. A patient with a high resorption potential is a poor orthodontic risk (Becks, 1939).

The question arises as to the cause of idiopathic root resorption, especially in persons showing a high resorptive potential as evidenced by unusual amounts of root resorptions. Becks (1939) suggested endocrine dysfunction on the basis of alterations in the basal metabolic

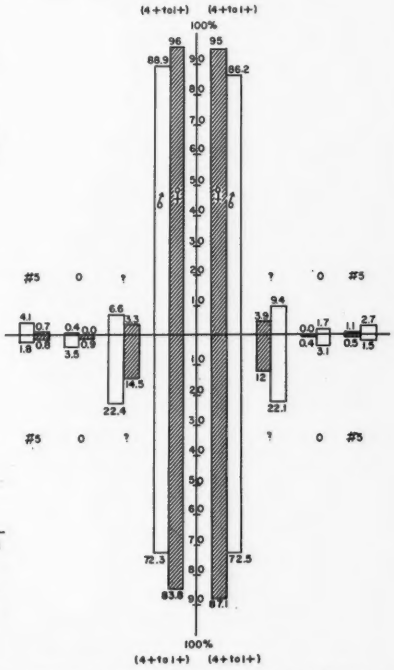

FIG. 4. Comparison of number (%) of teeth with root resorption in the four quadrants of maxilla and mandible. Note the strongly bilateral symmetry in the number of teeth affected. Note that more teeth are affected in the maxilla than in the mandible. (See also Figure 2A for detailed comparison between maxillary and mandibular teeth.

TABLE 1A

Distribution of 2730 teeth examined in 151 females according to degree of root resorption

Degree of Resorption	Percentage of Teeth Affected						
	Tooth Class.						
	1	2	3	4	5	6	7
4+	1.2	0.8	0.0	0.0	0.4	3.8	0.0
3+	2.7	1.2	6.7	11.6	5.5	4.3	0.0
2+	36.5	40.2	46.8	58.0	56.2	49.2	27.6
1+	56.0	47.8	44.5	29.0	32.8	33.7	72.3
?	1.5	7.4	1.9	1.3	3.9	8.3	0.0
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
#5	2.1	2.6	0.1	0.1	1.3	0.7	0.1
No. of maxillary teeth examined....	254	239	205	233	252	160	22
#5	0.9	0.1	0.1	0.5	1.9	0.8	0.3
0	2.6	0.4	0.0	0.4	0.4	0.0	0.8
?	20.1	16.4	15.8	11.3	7.2	11.2	10.8
1+	50.6	60.3	55.5	51.5	53.9	60.7	61.2
2+	24.3	20.9	28.1	35.9	35.3	26.7	23.5
3+	1.5	1.9	0.5	0.4	1.3	0.6	0.8
4+	0.0	0.0	0.0	0.0	0.0	0.0	2.6
No. of mandibular teeth examined..	263	192	189	237	218	156	110

TABLE 1B

Distribution of 3114 teeth examined in 150 males according to degree of root resorption

Degree of Resorption	Percentage of Teeth Affected						
	Tooth Class.						
	1	2	3	4	5	6	7
4+	0.0	0.0	0.0	0.0	0.0	0.0	0.9
3+	0.4	0.0	1.1	10.8	3.3	5.8	0.9
2+	11.3	16.0	48.4	46.2	38.7	17.4	19.3
1+	72.5	58.1	44.1	40.8	49.4	57.1	69.8
?	12.6	15.9	5.2	1.7	3.8	10.9	6.0
0	0.0	1.9	0.0	0.0	0.9	2.8	2.0
#5	3.2	8.1	1.2	0.5	3.9	6.0	1.1
No. of maxillary teeth examined....	259	257	270	231	232	175	87
#5	3.7	2.8	0.2	0.5	1.9	6.1	0.1
0	14.6	3.0	0.7	0.0	1.7	1.8	1.2
?	28.9	27.3	16.2	19.7	30.8	11.2	21.7
1+	48.5	63.8	73.3	59.0	53.3	67.8	70.1
2+	3.6	3.1	9.6	20.8	11.5	11.8	6.3
3+	0.7	0.0	0.0	0.0	0.8	1.3	0.6
4+	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No. of mandibular teeth examined..	273	257	259	258	233	152	174

TABLE 2A

Distribution of root resorption in maxillary and mandibular teeth in 151 females

Type and Degree of Resorption	Maxillary Teeth Affected		Mandibular Teeth Affected		Combined	
	No.	%	No.	%	No.	%
4+	12	0.8	3	0.2	17	0.6
3+	72	5.2	15	1.1	87	3.2
2+	647	47.3	386	28.2	1033	37.8
1+	568	41.7	754	55.3	1322	48.4
?	52	3.9	187	13.7	239	8.7
0	0	0.0	11	0.8	11	0.4
#5	15	1.1	9	0.7	24	0.9
	1366	100.0	1365	100.0	2731	100.0

TABLE 2B

Distribution of root resorption in maxillary and mandibular teeth in 150 males

Type and Degree of Resorption	Maxillary Teeth Affected		Mandibular Teeth Affected		Combined	
	No.	%	No.	%	No.	%
4+	1	0.06	0	0.0	1	0.03
3+	48	3.2	7	0.4	55	1.8
2+	444	29.4	153	9.6	597	19.2
1+	822	54.6	985	61.4	1807	58.07
?	125	8.3	371	23.2	496	15.9
0	14	0.9	59	3.5	73	2.3
#5	54	3.54	31	1.9	85	2.7
	1508	100.0	1606	100.0	3114	100.0

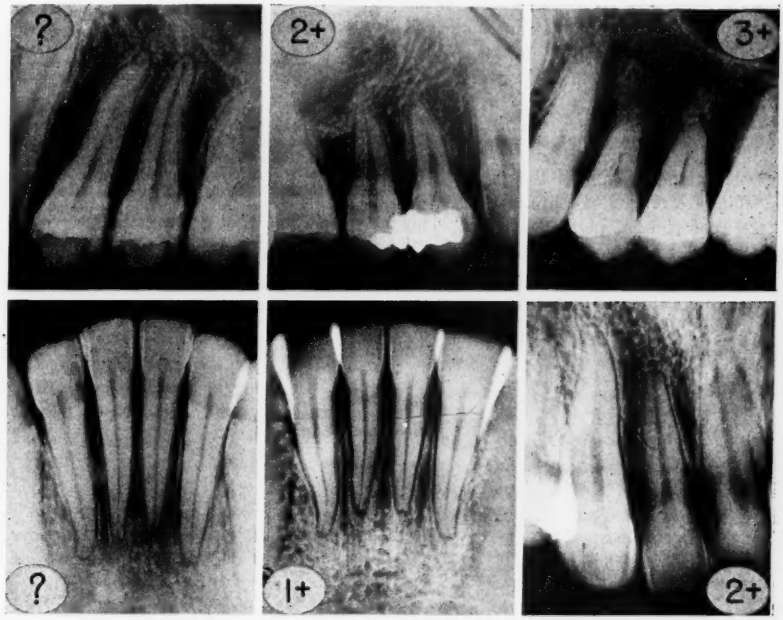

FIG. 5. Roentgenograms illustrating various degrees of idiopathic root resorption

rates of such persons. On the other hand, the work of Gruneberg (1938) with the grey lethal mouse and of Schour et al (1949) with the *ia* strain of rats suggests that osteoclastic resorption of bone and tooth substance is governed by genetic factors. This evidence is strong and supports the hypothesis that variations in the resorption potential among different individuals is a genetic (inherited) characteristic rather than acquired. This question should be pursued further by the analysis of familial trends in severe degrees of idiopathic permanent root resorption.

Exuberant osteoclastic activity is probably not confined to the tooth roots alone but should similarly affect the alveolar bone. It would be interesting to determine the relation between idiopathic root resorption and alveolar crest resorption.

CONCLUSIONS

This study confirms the fact that a definite resorptive potential is present in the root ends of permanent teeth. This potential towards root resorption, while less than in the primary teeth, does exist in practically all normal permanent teeth (figure 5). The resorption potential varies in different persons and also in different teeth of the same person (tables 1 and 2). This study indicates that the resorption potential of the permanent teeth is higher in young adult females than in males (figure 3).

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Unit News

Arkansas

The Arkansas Unit is continuing their policy of promoting clinics and speakers on pedodontics at the state dental meeting and were instrumental in having Walter C. McBride at the 66th annual convention.

Plans were discussed on "Operation Bitewing" which is a project to take radiographs of children during the state livestock show. Some obstacles have to be removed before the plan can be effective and the Unit is hopeful.

New officers for 1954 are:

C. W. Nickols—President
Haile P. Bowers—Vice-President
J. R. Luten, Jr.—Sec'y-Treas.

Northern California

Reporter Don Laston sends the following information of the 4th annual Pedodontic Seminar which was held in Carmel Valley from May 16 to May 19. Good fellowship alternated with intensive concentration in consideration of the program.

William Neuman, Ph.D., a biochemist from the University of Rochester, presented papers on "The Chemistry of Calcification—A New Theory" and "Fluoridation, An Appraisal of Present Evidence."

Donovan J. McCune, M.D. gave presentations on "Nutrition in Infancy and Childhood", and "The Mentally and Physically Handicapped Child."

Albert Davis, M.D. presented papers on "The Cleft Palate—Etiology and Care in Relation to Dentistry".

To augment the three headliners, research reports were presented by Drs. Walt Mandler, Charles Mehlum, and John Sowden.

Ten members of the Northern California Unit of A.S.D.C. have organized a postgraduate pedodontic course. This course is to be given by teams of two, to outlying districts in California as a refresher type seminar course in dentistry for children by the general practitioner.

Dean John Tocchini of the College of Physicians and Surgeons presented a program to the staff of Children's Hospital of the East Bay on May 11. His subject covered the problems of "Rubber Dam and Individual Matrix Techniques for Children."

At the California State Dental Meeting in April, 1954, table clinics were presented on various phases of pedodontics by the following members of the Northern California Unit: Drs. Bernard Smith, Art Dugoni, Gaylord Holmes, Bill Holloway, Walt Mandler, Searles Boynton, Carl Johnson, Wilfred Forbes, Charles Sweet and Irwin Beechen.

New York

At the annual meeting held May 12 at the Hotel Statler in Buffalo, N. Y. the following officers were elected:

Solomon N. Rosenstein—President
Hugh Keenan—Pres. Elect
Daniel Tobin—Vice Pres.
James C. O'Malley—Sec'y-Treas.
Joseph Kauffmann—Editor

Hawaii

A group of Honolulu dentists having received a charter to form a territorial Unit of the American Society of Den-

tistry for Children, met at the Strong-Carter Dental Clinic, Honolulu, on December 18, 1953 and formally organized the Hawaii Society of Dentistry for Children.

The proposed by-laws provide for four membership classes: Active, associate, affiliate and honorary. Active membership is limited to members of the Hawaii Territorial Dental Society; associate membership includes those dentists who are members of the American Dental Association but not members of the Hawaii Territorial Dental Society; affiliate membership is open to any person who is interested in the advancement of dentistry for children and honorary membership may be conferred by the Society on any person who has contributed in any exceptional manner to the advancement of child health.

Since the Hawaii Society of Dentistry for Children is a component of the American Society of Dentistry for Children, membership dues for both organizations will be collected locally ($2.00 for this Society and $5.00 for the national, which includes the annual subscription to the Journal of Dentistry for Children).

Dr. Paul Schiff of Inglewood, California, who spent the Christmas holidays vacationing in Honolulu with his wife and parents was the first speaker to address the group. His lecture which featured "Child Management" but included other practical hints for pedodontists was well received. The meeting was held on December 30, 1953 at the Strong Carter Dental Clinic.

The Society held its first annual meeting and election of officers on June 24, 1954, at the Kewalo Inn, Honolulu.

Dr. Leslie M. FitzGerald, of Dubuque, Iowa, president of the American Dental Association, brought greetings from the American Dental Association and Dr. Bernard Jankelson, of Seattle, Washington, spoke on "The Correction of Traumatic Occlusion in Children's Dentition".

Dr. Arthur Chun-Hoon, of Honolulu, will head the Society until the second annual meeting in June 1955. Other officers elected were: Dr. John E. Knight, vice-president, and Dr. Ralph N. Akamine, Secretary-treasurer, both of Honolulu.

The Unit now has 86 charter members. All the major islands are represented; with 55 members on Oahu, 11 on Hawaii, ten on Maui and ten on Kauai.

The retiring officers are: Dr. Albert Lemes, president, Dr. S. W. Glynn, vice-president and Dr. John H. Dawe, secretary-treasurer.

Michigan

The Michigan unit completed its activities by inviting the Senior classes of the U. of M. and U. of D. to a special panel discussion on practice management. It was President Bill Brown's idea and a successful one. Not only was it an opportunity for the senior to get good advice about starting a practice but an opportunity for the Society to introduce these men to its activities.

At the annual state meeting Henry Wilbur was the guest speaker and he did his usual fine job. Henry spoke about the future of pedodontics.

The election which followed the luncheon resulted in the following slate of officers:

Ross Scharfenberg—President
Hugh M. Kopel—Vice President
Joseph Cabot—Sec'y-Treas.

North Carolina

On May 18, 1954, a meeting was called at Pinehurst, North Carolina, for the purpose of organizing a North

Carolina Unit of the American Society of Dentistry for Children.

Sixty-five members of the North Carolina State Dental Society were in attendance. Fifty-two have paid their dues and their names and dues have been forwarded to Francis C. Harwood, Business Manager, American Society of Dentistry for Children.

Dr. J. B. Freedland of Charlotte, North Carolina, was elected president; Dr. R. A. George, Vice President; and Dr. W. W. Demeritt, Secretary-Treasurer.

The following members of the North Carolina State Dental Society have applied for a charter for the North Carolina Unit of the American Society of Dentistry for Children:

Frank Atwater, 1202 Madison Avenue, Greensboro, N. C.

David L. Beavers, 640 Nissen Building, Winston-Salem, N. C.

David H. Becker, 203 Commerce Building, Asheville, N. C.

Robert H. Benfield, 1303 Liberty Life Building, Charlotte, N. C.

Glen F. Bitler, 801 Professional Building, Raleigh, N. C.

Boyce A. Brantley, Box 394, Mooresville, N. C.

John C. Brauer, School of Dentistry, Chapel Hill, N. C.

Amos S. Bumgardner, 1516 Elizabeth Avenue, Charlotte, N. C.

Joseph F. Burket, School of Dentistry, Chapel Hill, N. C.

R. B. Campbell, 739 Providence Road, Charlotte, N. C.

Marvin Chapin, School of Dentistry, Chapel Hill, N. C.

Vance Lee Crouse, 5A Doctors Building, Charlotte, N. C.

William M. Ditto, 912 North Elm Street, Greensboro, N. C.

William W. Demeritt, School of Dentistry, Chapel Hill, N. C.

Marvin Evans, School of Dentistry, Chapel Hill, N. C.

Walter H. Finch, Jr., Box 862, Henderson, N. C.

T. S. Fleming, P.O. Box 601, Tarboro, N. C.

J. B. Freedland, 1206 Liberty Life Building, Charlotte, N. C.

Ervin M. Funderburk, 1012 Kings Drive, Charlotte, N. C.

James E. Furr, Jr., 1009 Murchison Building, Wilmington, N. C.

Robert A. George, 217 South Park Avenue, Mt. Airy, N. C.

Joe Goldwasser, 106½ West North Street, Kinston, N. C.

W. Kimball Griffin, 1004½ West Main Street, Durham, N. C.

Paul T. Harrell, 515 South Wingate Street, Wake Forest, N. C.

Franklin G. Harris, Box 188, Sanford, N. C.

Guy V. Harris, 511 Trust Building, Durham, N. C.

J. William Heinz, 1516 B. Central Avenue, Charlotte, N. C.

Donald L. Henson, 208 Glenwood Avenue, Kinston, N. C.

D. F. Hord, Box 301, Kings Mountain, N. C.

R. F. Hunt, P.O. Box 926, Rocky Mount, N. C.

Grover Hunter, School of Dentistry, Chapel Hill, N. C.

T. M. Hunter, Box 276, Henderson, N. C.

Samuel H. Isenhower, 205 West 8th Street, Newton, N. C.

H. C. Jamison, County Health Department, Charlotte, N. C.

Ralph E. Kilpatrick, 325 Sunset Avenue, Asheboro, N. C.

Kermit Knudtzon, School of Dentistry, Chapel Hill, N. C.

James Lee, 201 West College Street, Mt. Olive, N. C.
Roy Lindahl, School of Dentistry, Chapel Hill, N. C.
Walter T. McFall, 602 Flatiron Building, Asheville, N. C.
Luther M. Massey, Zebulon, N. C.
L. H. Paschal, 805 First Citizens Bank Building, Fayetteville, N. C.
E. A. Pearson, Jr., 410 Professional Building, Raleigh, N. C.
Lackey B. Peeler, Suite 6-C Doctors Building, Charlotte, N. C.
J. B. Powell, Main Street, Clinton, N. C.
Richard E. Richardson, School of Dentistry, Chapel Hill, N. C.
Pearce Roberts, Jr., 417–18 City Building, Asheville, N. C.
Freeman C. Slaughter, 209 Professional Building, Kannapolis, N. C.
Thomas A. Smith, 90 Manteo Drive, Havelock, N. C.
Lt. John B. Sowter, D.C., US Naval Hospital, Camp Lejeune, N. C.
R. Harold Turlington, Henry Vann Building, Main Street, Clinton, N. C.
Marvin Walker, 1431 Broad Street, Durham, N. C.
Roy W. Wilson, 818 Professional Building, Charlotte, N. C.

Missouri

The Missouri unit of the American Society of Dentistry for Children met on Monday May 10, 1954. Dr. Charles Waldron, head of the department of oral pathology at Washington University School of Dentistry, St. Louis, spoke on "Some Oral Lesions of Interest to the General Practitioner". Election of officers was held and they are:

President: John E. Holland
Vice-President: John E. Gilster
Sec'y-Treas.: Vernon E. Truetzel
Editor: William Brandhorst

Plans are being made to hold the annual picnic in the Fall this year.

Indiana

The organizational meeting of the Indiana Unit of the American Society of Dentistry for Children was held Tuesday, May 18, 1954, at the Claypool Hotel in Indianapolis, Indiana. Opening remarks were made by Dr. Ralph E. McDonald, and after appointing Dr. R. E. Jennings as acting secretary, Dr. McDonald turned the meeting over to Dr. Walter McBride of Detroit, Michigan, who gave a brief history of the A.S.D.C. and then explained the working of the Michigan Unit.

Election of officers was then held and Dr. Ralph E. McDonald, Indianapolis, was unanimously elected President. Drs. Stragand and J. M. Bryan were nominated for the office of President-elect, and the resulting vote gave a narrow margin to Dr. J. M. Bryan of Evansville. Unanimous ballots were cast for the following two offices: Dr. Stamper, Indianapolis as Vice-president and Dr. Jennings, Speedway, for Secretary-treasurer.

It was moved and carried that Dr. Jennings be the elected delegate with Dr. McDonald at the National A.S.D.C. meeting in Miami this Fall.

It was moved and carried that the local dues be $3.00 per year, payable immediately for 1954, and subsequently each calendar year.

It was further moved and carried that another meeting be held not later than the fall of 1954 and suggested by Dr. Koss that if possible it be held in conjunction with the Indiana Dental Alumni Meeting at the Bloomington campus in October of this year.

(*Continued on page 173*)

AMERICAN SOCIETY OF DENTISTRY FOR CHILDREN

Annual Meeting

SHORE CLUB HOTEL, MIAMI, FLORIDA

November 6–7, 1954

OFFICERS 1953–54

HUGH KEENAN.....*President*
WILLARD T. HUNNICUTT.....*President-Elect*
HENRY M. WILBUR.....*Vice-President*
ALBERT ANDERSON.....*Secretary-Treasurer*
ALFRED E. SEYLER.....*Editor*

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WILLARD T. HUNNICUTT
HENRY M. WILBUR
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ALFRED E. SEYLER
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HAROLD A. MAXMEN '55
C. F. TUMA '54
LAWRENCE R. BURDGE '54
EARL L. LAMPSHIRE '54

PROGRAM

FRIDAY, NOVEMBER 5, 1954

6:30 P.M.—T.V. ROOM

EXECUTIVE COUNCIL DINNER MEETING

SATURDAY, NOVEMBER 6, 1954

9:00 A.M.—12:00 Noon—Card Room

EXECUTIVE COUNCIL AND STATE DELEGATES' MEETING

12:00 Noon to 2:00 P.M.—Surf Room

PRESIDENT'S LUNCHEON Honoring essayists, clinicians and committee chairmen

SPEAKER: Mr. Tracy B. Hare

Administrator, Variety Children's Hospital, Coral Gables, Florida

Music by High School Chorus

Ladies and guests' hospitality room open all day Saturday and Sunday—**T. V. ROOM**

2:00 P.M. to 5:00 P.M.

Essayists' Panel: "THE CHILD, THE DENTIST AND FEAR"

PARTICIPANTS:

DR. GRANVILLE FISCHER, Professor and Head of the Department of Psychology, University of Miami, Florida

DR. JAMES ANDERSON, Practicing Psychiatrist, Miami, Florida

DR. JOHN C. BRAUER, Dean, College of Dentistry, University of North Carolina

DR. GEORGE TEUSCHER, Dean, School of Dentistry, Northwestern University, Chicago, Ill.

MODERATOR: DR. ALFRED E. SEYLER, Editor, Journal of Dentistry for Children

SUNDAY, NOVEMBER 7, 1954

9:00 A.M. to 12:00 Noon—Table Clinics—Patio Passageway

12:00 Noon to 1:30 P.M.—LUNCHEON—Promenade Room

1:30 P.M. to 4:00 P.M.—New Orleans Dining Room

GENERAL BUSINESS MEETING AND ELECTION OF OFFICERS

6:30 P.M.—New Orleans Dining Room

ANNUAL BANQUET

SPEAKER: MR. WAYMAN PARKER, Jackonsville, Florida

Wives, hygienists and assistants are invited to attend our functions

TABLE CLINICS

SUNDAY, NOVEMBER 7, 1954

9:00 A.M. to 12:00 Noon—Patio Passageway

1. The Replantation of Young Permanent Incisors.
   Dr. Wm. E. Brown, University of Michigan, Ann Arbor, Mich.
2. The Use of Chrome Steel in Dentistry for Children.
   Dr. Wm. P. Humphrey, Denver, Colorado.
3. Root Canal Therapy for Primary Teeth.
   Dr. Louis B. Edelsten, Newark, N. J.
4. Helpful Aids in Treating the Handicapped Child.
   Dr Milton E. Gellin, Cleveland Heights, Ohio.
5. Mechanical Condensation of Amalgam.
   Dr. Wm. Funkhouser, Jr., Atlanta, Ga.
6. Prothesis for Children.
   Dr. David Weber, Springfield, Massachusetts.
7. Appliances to Re-open Space.
   Dr. B. Rabinowitch and Dr. Edith Strauss, Los Angeles, Cal.
8. The Oral Screen for the Correction of Mouth Breathing.
   Dr. Maury Massler, University of Illinois, Chicago, Ill.
9. Cavity Preparation.
   Dr. Henry Wilbur, University of Louisville, Kentucky.
10. Palliative Orthodontics and Early Treatment.
    Dr. Lafayette Barrett, Atlanta, Ga.
11. Space Maintenance Involving the Unerupted First Molar.
    Dr. J. M. Eisenson, Denver, Colorado.
12. Radiology in Children's Dentistry.
    Dr. Andrew H. Uterhart, Lexington, Kentucky.
13. Differential Diagnosis Between Simple Cases of Malocclusion and those Cases Which Appear to be Simple.
    J. Wms. Adams, Indiana University, Indianapolis, Indiana.
14. Pulpotomy, Pulpectomy and Pulp Capping.
    Dr. Adeeb E. Thomas, University of Alabama, Birmingham, Ala.
15. Dental Pediatrics.
    Dr. Sidney B. Finn, University of Alabama, Birmingham, Ala.
16. Diagnostic Considerations in Preventive and Palliative Orthodontics.
    Dr. Herbert L. Hayward, Bellerose, Long Island, N. Y.
17. Group Clinic, Sociedad Cubana de Odontologia Infantil, (Cuban Society of Dentistry for Children), under the direction of Dr. Antonio Cyclone Montero.
18. Prophylaxis, Orthodontics and Tooth Guidance.
    M. M. Cohen, D.M.D., Tufts Dental School, Boston, Mass.
19. Ideal Dentistry in the Difficult Child.
    Stanley S. Kouffman, D.D.S., Tufts Dental School, Boston, Mass.
20. Radiography for Children.
    Harold Berk, DDS, Tufts Dental School, Boston, Mass., Harold K. Addelston, D.D.S., NYU Dental School, N. Y., N. Y.
21. A Simple Method of Guiding the Unerupted First Permanent Molar into Position when the Second Primary Molar is Lost Prematurely.
    Joseph G. Keller, D.D.S., N. Y.
22. Chair Side Education of the Child Patient and Parent.
    M. Joel Freedman, D.D.S., NYU Dental School, N. Y., N. Y.

STANDING COMMITTEES

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Professional Relations—Paul F. Sydow, *Chairman*
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Unit News—Continued

FLORIDA

The Florida Unit was host to Ken Easlick of Michigan who appeared at the Florida State Dental Convention at Daytona Beach in May. The accompanying photo shows Dr. Easlick at his smiling best!

Members of our Unit presented a table clinic at the Florida State Meeting and the photo below shows several of our members who attended. Standing in the front row from left to right: Victor Lenchner, Ellen B. Crockett, Jerry Hagan, Antonio Montero of Havana, Charles E. Oxar, Wendell L. Whetstone, and Jose Morejon Aduriz of Havana. The two men from Havana belong to the Cuban Children's Dental Society and have joined the ASDC thro our Unit.

TENNESSEE

The Tennessee unit of the American Society of Dentistry for Children met in Chattanooga on May 9th. Our meeting was a part of the Annual meeting of the Tennessee State Dental Association.

Attendance at the meeting was very good. At the present time there seems to be a renewed interest in the activities of the Society. An attempt is being made to enroll as many new members as possible. Our membership drive will be not only directed at the recent graduates but also to the many dentists interested in

dentistry for children but who have not been invited to join us as a society.

Dr. William Brown presented a very interesting and informative discussion on "The Management of Traumatized Young Teeth." Rather than follow the old custom of having a luncheon speaker, this year the feature of the luncheon was the showing of Bill Humphrey's film on "Steel Crown Technic." Many members commented that we had a very successful and instructive meeting.

Washington

The Washington Unit is enjoying an active year and announces it will sponsor a two day meeting to be held Saturday and Sunday October 23–24 at the Meany Hotel in Seattle. Dr. Eugene West of the University of California Dental School will be the main speaker, on the subject "Problems of the Primary and Mixed Dentitions". Charlie Meyer is planning for a large turnout for this excellent meeting.

Minnesota

Ken Erickson informs us that the Minnesota Unit will present its 5th Annual all-day Meeting on Friday, October 15, 1954, with the following program scheduled:

8:00 A.M. Registration

9:00 A.M. "Normal Behavior Patterns in Young Children and Dental Practice" Dr. John E. Anderson—Director of the Institute of Child Welfare, University of Minnesota.

10:00 A.M. A Discussion of Dr. Anderson's paper. Dr. Reynolds Jenson — Associate Professor of Pediatrics, Department of Psychiatry, University of Minnesota Hospital.

10:30 A.M. General Discussion by the audience of the material presented above. Questions and answers.

11:00 A.M. "Treatment of Permanent Anterior Teeth with Fistulas" Dr. James Jensen—University of Minnesota Dental School.

12:00 Noon. Luncheon. "Doing Your Job to Suit Yourself" Speaker: Dr. Walter T. McFall.

2:00 P.M. "Clinical Problems in Pedodontics" Dr. George W. Teuscher—Dean, Northwestern University Dental School, Chicago, Illinois.

4:00 P.M. "Everyday Dentistry for Children" Dr. Walter T. McFall.

Ohio

The following officers were elected at our American Society of Dentistry for Children Group, *Cleveland Chapter* at our April Meeting for the 1954–55 year

Dr. Norman Colebrook—President
Dr. Finn F. L'Orange—Vice President
Dr. R. J. Bruckner—Secretary
Dr. H. L. Adelstein—Treasurer

The *Columbus*, Ohio Chapter of A.S.D.C. at its May Meeting elected the following officers for the 1954–55 year:

Mike Goodman—President
Harold L. Monett—Vice President
Everett Tracy—Sec-Treasurer

Should Children Be Released During School Hours to Receive Private Dental Care?

LEONARD F. MENCZER, D.D.S. M.P.H.*

IN DAYS of old, the releasing of school children during school hours for other than strictly educational purposes, or other than school events, was a chronic source of irritation to the puritanical educator. Frequently, where such permission was granted, it was done with both resistance and reluctance.

Apparently, this picture is gradually changing. A national survey undertaken in June 1953 to determine these existing practices, demonstrates that in the field of dentistry, in particular, there is the growing recognition that dental health plays an important role in general health and that the need for dental care is so vast that some school time must be sacrificed for the child's well-being.

It is true that the educator is frequently harassed by health, welfare, religious, music, dancing and other groups. Each feels that its interest is as important as the formal education of the child, and each demands that school time be sacrificed in order to meet its particular needs.

Like most problems, there are two sides to this question. As it pertains to dental health, here is the dentist's viewpoint:

The dental profession for many years has been confronted with the problem of meeting the dental needs of school-age children. Recent studies (1, 2) have demonstrated that the majority of school-age children do not receive adequate dental care.

The fact that these needs reach enormous proportions is without question. As the age of the child increases, there is an increase not only in the percentage of children having dental defects but also in the number of cavities per child (3). It was recently found (4) that among preschool children, 16.1% of two-year olds suffer more than four involved teeth and 84.9% of six-year olds suffer more than six involved teeth. From other studies (5), it is estimated that the average individual from age five to age twenty can expect to acquire approximately 1.3 new cavities per year.

It has been pointed out by many different students of the dental problem that if the entire dental manpower of the United States were devoted exclusively to the dental needs of school-age children, there would still be insufficient personnel to meet those needs. Because of this, it is essential to adopt every preventive technique available in order to reduce the incidence of dental decay and to begin treatment and education in prevention as early as possible in order to prevent a multitude of future dental disasters or pathological conditions.

Dentistry for children has often been spoken of in such glowing terms as "socially advantageous," "economically logical", and "professionally intelligent".

* Public Health Dentist, Hartford Health Department, Hartford, Connecticut.

Until recently, these phrases have failed to attract even the number of dentists needed to meet the requirements for "effective demand dentistry" (6), much less the total needs of this age group. ("Effective demand dentistry" is defined here as the desire for dental service plus the ability to pay for it.)

During the past ten years, many remarkable and favorable changes in children's dentistry have come about. Today, due to changing conditions and years of thoughtful education, there is not only an acceptance of juvenile dentistry but a demand for it. There is still much to be accomplished within the profession, but also a great deal of assistance and cooperation is necessary from without, if every attempt is to be made to preserve the oral health of our younger citizens.

Dentistry has long sought the co-operation of the community in general and the educator in particular in recognizing the urgent need for good oral hygiene. The dental profession has worked hard to create an awareness of the magnitude of the dental health problem and its immediate importance to every individual as a personal problem. Even today, the relationship of dental health to general health and personal appearance is not fully appreciated.

By the time a child enters school his first permanent molars (usually referred to as the six-year molars) appear, and almost all the permanent teeth should be present in the mouth at graduation from high school. It is during this period of school life that the importance of dental preventive and control measures may be impressed upon the pupil most effectively (7). Because of this, the teaching of preventive dental measures alone is not sufficient. The inclusion of such phases of dental health as the care of one's teeth and the correction of one's dental defects should also be stressed. Using school time for this type of educational health experience and developing positive attitudes towards dental care contributes to both the knowing and doing phases of health instruction (8).

The educator, then, represented by the school superintendent, since he is the educational leader of the community, has numerous responsibilities regarding the dental health of school children. For this reason, the decision about excusing pupils from school in order to keep dental appointments during school hours should be made with a full knowledge of the dentist's point of view.

In many communities throughout this country, a harmonious working arrangement between the dental profession and the educator does not exist. The dentist feels that every day should be one of dentistry for children. In other words, dental defects must be treated early and cannot wait upon random, periodic intervals. Because of the rapidity of tooth decay in primary teeth and the need for frequent attention during that period when the mixed dentition exists (the baby teeth being replaced by the permanent ones) it is necessary for the young patient to be under constant dental supervision—as frequently as three times annually. For older children, beyond 12 years of age, twice annually may suffice.

Dentistry for children, unfortunately, is not practiced by every member of the profession. The burden of meeting the dental needs of that "effective demand" group is thrown upon a disproportionately few dentists in any given community. In addition, there are two specialties in the profession of dentistry

that are devoted exclusively to the treatment of children, the pedodontist (one who specializes in the care of children's teeth) and the orthodontist (one who specializes in the correction of dental irregularities). These two specialties because of their limited number, can never hope to meet the needs of school-age children by limiting treatment time to after school hours, Saturdays and vacation periods and as a group they suffer most from existing policies whereby a child may not be excused during school hours to receive dental care.

It becomes contradictory for a school system to accept and discharge the responsibilities of carrying out a dental health education program, to stress dental health and the results of its neglect without making some provisions for enabling that "effective demand" group to receive the necessary dental care. In addition, a school educational program directed toward dental hygiene fosters the growth of another group, "potential demand" (6) that also desires dental service but cannot afford to pay for that dental care. For this latter group, the establishment of school dental clinics is desirable.

Good dentistry can be practiced only in the setting of a good patient and a good dentist.

From the child's standpoint, there are several factors that may well keep him from being a good dental patient. A day at school may be fatiguing for any child. A dental appointment added to a long and perhaps difficult day at school may be more than some children can stand emotionally. Many children resent the taking of their play time and holidays for dental appointments. This may create a management problem, and at the same time constitute a total loss as an educational experience.

From the dentist's standpoint, there are several factors that keep him from working effectively on children. He practices dentistry for children best during the early morning and early afternoon when both he and the child are freshest. Because his workload increases as the day progresses (as well as the onset of fatigue in the late morning and later afternoon), his threshold of irritability lowers. Because of this, to suggest that he devote after-school hours to children's dentistry is somewhat unreasonable. In addition, since the early morning and early afternoon are times when the dentist is least busy, he can apply Rousseau's axiom that, "the training of children is a progression where we must learn how to lose time in order to gain it." The training of a child to become a good dental patient requires time, patience and skill.

The suggestion is often made that in addition to after school hours, Saturdays and vacation time be devoted to dental care for school-age children. Both, of course, should be utilized to a maximum. The dentist realizes that repeated appointments during school hours is not only disrupting to the entire class but may seriously handicap a child's formal education and for that reason, he wants to keep such appointments to a bare minimum. However, even if every Saturday were devoted solely to dentistry for children, there are not enough Saturdays to meet the demand. Also such a program would seriously handicap those adult patients who are employed on an hourly basis and who cannot make a dental appointment during the work week.

Vacation time, of course, is ideal for meeting and completing the dental needs of school-age children. Unfortunately, the completion of dental needs at any one time is only temporary, since periodic follow-up care is essential. Of necessity, therefore, completion of dental needs during the summer vacation period by no means precludes the child's needing further care the following fall or winter.

Since good dental health contributes significantly to a child's well-being, and since this contribution makes a child more physically capable of absorbing his school experiences, every effort should be made by both the dentist and the educator to aid the child so that he may grow in health.

A major objective of education is *health*. In view of this, a survey was undertaken to determine the attitude of educators to the question of excusing children during school hours in order to receive private dental care. As anticipated, the results of this study demonstrated that the educator is well aware of the importance of oral hygiene and has taken steps to combat oral diseases.

Questionnaires were sent to the superintendents of schools of all cities with a population of more than 90,000 (1950 census). Cities from Fresno, California (population, 90,618) to New York City, New York (population 7,835,099) were covered.

125 questionnaires were mailed in June 1953 and a total of 94 replies have been received. It is interesting to note that of the 48 states, only 42 have one or more cities falling into the population range enumerated above. Accordingly, from questionnaires sent to these 42 states and the District of Columbia, replies were received from 33 of them and Washington, D.C. These replies have been grouped in the following manner:

Population	*No. of Cities Questionnaire Mailed to*	*No. of Replies*	*% of Replies*
90,000 to 100,000	19	14	74
100,000 to 250,000	66	46	70
250,000 to 500,000	22	18	82
More than 500,000	18	16	90
	125	94	75

An adequate representation of replies have been received from the population groupings listed above and from these, a good idea of existing practices may be obtained.

The following questionnaire was sent:

1. Are students in your school system excused during the school day to visit a private physician or dentist?
   a. Does any legislation (state or local) or school policy exist specifically authorizing the absence of children from school for this purpose?
   b. If such legislation does exist, what was its date of enactment? (It is requested that a copy of such legislation be enclosed in your reply)
2. Does your Board of Education have specific forms for private Medical or Dental Appointment Service i.e. noting the time of the child's departure from school, the time of departure from the doctor's office, etc.? (It is requested that a copy of such a form be included in your reply)

3. In the event of permitted absenteeism during the school day for health service, are provisions made for transporting the child to and from the private practitioner's office?
   a. If not, does the Board of Education assume any responsibility for injury to a child on authorized absence for this purpose?
4. Is authorized absence from school for health service deemed an absence in computing average daily attendance in order to secure apportionments from state school funds?
5. What objection if any can you see as an administrator in permitting a child to leave school during the school day in order to receive private medical or dental attention?
6. Remarks:

In reply to question 1 of the questionnaire, *are students in your school system excused during the school day to visit a private physician or dentist?*, 94 replies were received and these have been grouped into three categories:

63 replied, "Yes"
15 replied, in effect, "Sometimes"
16 replied, "No"

The following additional remarks to the "Yes" replies were:

"Yes, students may be excused during the school day to visit a private physician, dentist or optometrist."

"Yes, definitely. We have had a long established policy of liberal excuses for medical and dental appointments."

"Yes, upon written notice from the parent or guardian of the child to the school authority."

"Yes, . . . Only for such time as needed for treatment. Dentists have agreed to send children back to school immediately."

The following additional replies to the "Sometimes" were:

"Occasionally, upon the request of the parent. We encourage appointments to be made out of school hours but at the same time try to be reasonable in terms of the best health of the pupil. For example, a child having considerable dental work to be done may be required to go occasionally during school hours."

"When visits outside school hours impossible."

"Problems of this nature are dealt with on an individual basis in the different schools as the situation arises. We encourage that dental appointments and appointments with other doctors be made after school hours, but if an emergency arises and such an arrangement is not possible, and if the parent presents a written request for a child to leave school to visit either a physician or a dentist, these requests are usually granted."

The following additional remarks to the "No" replies were:

"Very infrequently—usually in emergency cases only."

"No, only in extreme cases are students excused. The exception holds for special work with orthodontists or examinations by physicians where it is impossible to meet the particular physician except during school hours."

"No, only to visit public clinics or private physicians and dentists who charge children clinic rates."

In seeking additional information concerning question 1 a., *does any legislation (state or local) or school policy exist specifically authorizing the absence of children from school for this purpose*, and question 1 b., *date of enactment of such legislation*, a separate questionnaire was addressed to the State Departments of Education of the 48 states and the District of Columbia. Of these 49 questionnaires, replies were received from 44 (43 states and the District of Columbia). From these, it was learned that only California has legislation (enacted in 1951) which specifically authorized the absence of a pupil from school for the purpose of having medical and dental service rendered, such absence not deemed an absence in computing average daily attendance. This may be found in the Education Code of California, Sections 6804 and 6806 quoted below:

Sec. 6804 "Any absence of a pupil from school for the purpose of having an optometrical or medical service rendered which does not exceed one day or fraction thereof during each school month of 4 weeks, shall not be deemed an absence due to illness under section 6803 (Added by Stats. 1951, Ch. 228. In effect May 3, 1951)."

Sec. 6806 "No absence of a pupil from school for the purpose of having dental service rendered shall be deemed an absence in computing average daily attendance (Added by Stats. 1951, Ch. 228. In effect May 3, 1951)."

The latter statute is further clarified by *instructions for keeping the state school register*:

> "All absences of a pupil for dental service are to be recorded in the same manner as other absences, then a small "d" placed in the same square and the square circled in red ink. The circled absences are to be included in the monthly attendance total. There is no limit to the number of dental absences that can be credited as attendance during the month."

Though California is the only state with specific legislation regarding this matter, several states have formulated policy concerning it.

For example:

Commonwealth of Massachusetts:

> "The Massachusetts School Health Council composed of members of the staffs of the Department of Education and Public Health considers matters concerning the schools and various health personnel and they make the following recommendations:
>
> "Children who need medical or dental care, and who by necessity must make appointments with private doctors or dentists during the regular school hours, should be accorded the same privilege as that enjoyed by children who, with the approval of school authorities attend clinics, i.e., excuse without absence."

North Carolina:

> "The policies of the state board of education have approved the absence of children from school in order to receive health service, including dental services."

Oregon:

> "We, (State Department of Education) encourage in our publications on school health services and in our in-service workshops for teachers and school administrators, that children be excused from school in order to benefit from health service pertaining to medical or dental attention."

Michigan:

> "There is no specific legislation as such but only a quasi-legal policy determined jointly by the Michigan Department of Public Instruction and the Michigan Department of Health recommending such excuses."

The vast majority of the remaining replies from the State Departments of Education were to the effect:

> "We do not have any legislation or policy at the state level concerning this matter. However, the matter of excusing pupils during school hours to keep dental appointments is one solely within the discretion of the local board of education."

At the same time they add:

> "A very high percentage of our schools do release students for medical and dental health where it is requested by a physician or dentist." or
> "The practice in this state is to permit such absences."

Having reviewed these attitudes at the state level pertaining to the practice of releasing school children, it is interesting to note local action. From this survey, it was found that in spite of recommended state policies concerning excused absence for this purpose, the local community takes such independent action as it sees fit.

Since only one state legislatively authorizes absences for this purpose (California), it means in essence that these practices are dependent upon the local boards of education. In this survey, even though 63 of the 94 reporting communities favor, with a positive attitude, the release of children during school hours for health service, only a relatively few have written established policies with regards to it.

Of the 63 boards of education reporting in the affirmative, the results were as follows:

12 replies from California schools have local policies conforming with state legislation.
11 replies included copies of formal formulated policy explaining the "how" and "why" this came about.
40 remaining replies stated that they were following recommended state board of education policies or that it was a local school policy but failed to mention whether it was a formal policy or merely a practice left to the discretion of the individual principal.

The attitudes of these 40 may be summarized as follows:

"It is a common practice and I know of no written policy covering it. Children are encouraged to make appointments when school is not in session but this is not always possible and recognition must be made of the fact."

Of the eleven replies mentioned above, formal policies have been adopted in the following communities in order of population:

City	*Population*
Dearborn, Michigan	95,000
Sommerville, Massachusetts	102,000
Evansville, Indiana	110,000
Erie, Pennsylvania	130,000
Tacoma, Washington	139,000
Providence, Rhode Island	275,000
Toledo, Ohio	300,000
Kansas City, Missouri	453,000
Milwaukee, Wisconsin	633,000
Cleveland, Ohio	906,000
Chicago, Illinois	3,600,000

It is interesting to note how these school policies came about and for the information of the interested reader, a few are quoted verbatim:

COPY COPY COPY

Superintendent's Bulletin of January 20, 1949—Vol. 2, No. 36
BOARD OF EDUCATION
City of Chicago, 1
228 North LaSalle Street

January 20, 1949

Excusal for Dental Appointments During School Hours

Educators are well aware of the great importance of dental health for children. Approximately 480,000 school children in Chicago are in need of dental care because of existing defects. It is impossible for the children to receive this care on Saturdays and after school hours.

In view of this critical health situation, a plan has been developed whereby more children can receive the dental care so essential to their physical, social, and scholastic welfare. This plan permits the excusal from school for dental care under certain regulations upon the approval of the principal of the school.

All members of the Chicago Dental Society have received a statement of the plan and the forms. Copies of the letter and form are being sent to the schools. The dentists have been informed that a request for excusal from school work should be sent only when it is impossible to schedule the child at any other time. In such instances, the parent and dentist will sign the application, and it will be presented to the principal for approval. It has been suggested to the dentist that when more than one appointment must be made during school hours, the schedule be staggered, and when necessary the dentist should make it possible for the teacher or the principal to change the hour of appointment upon reasonable notification.

The success of this plan will depend upon the cooperation of the parent, the dentist, and the school authorities.

Signed
General Superintendent of Schools

COPY COPY

Health Department
Evansville Public Schools
Evansville, Indiana

March 1953

Early in the school year 1947–48 Superintendent _____ appointed a committee to formulate a policy between the medical and dental societies regarding excusing children for appointments during school. Upon the recommendation of this appointed committee the school administrators, the Vanderburgh County Medical Society, and the Evansville Dental Society adopted October 21, 1947, the following policy:

POLICY FOR EXCUSING CHILDREN DURING THE SCHOOL DAY TO FILL DENTAL OR MEDICAL APPOINTMENTS

The committee recommends that a child be excused for dental or medical appointments providing the following plan be used:

I. A written request or its equivalent should be received from the parent for a child to be excused for a dental or medical appointment.
II. Principal should verify appointment with the dentist or doctor concerned.
III. The child should obtain a written statement from the dentist or doctor stating that the child has filled said appointment at stated time.

This does not apply to emergency cases.

The schools, dentists, and medical profession have agreed to cooperate in attempting to make as many dental or medical appointments as possible during the summer, on school holidays, Saturdays, and after school. This policy should be stressed by each principal to his P.T.A.

(Signature of Committee members)

The following form may be secured from the Public Schools Health Office to be taken to the dentist or doctor:

DATE _____

This is to certify that I attended _____
in my office today at ——— A.M. ___ ___P.M.

Signed _____

Providence, Rhode Island has adopted a plan now in operation which limits excused absences from school for dental appointments with a private dentist to six per term. "Each pupil is to have an appointment card to show that an appointment has been made." The same number of excused absences are applicable for visits to the Joseph Samuels Dental Clinic.

The Dearborn Public Schools, in its Revised Statement Relative to Policies Concerned with Excusing Students from School for Outside Activities, decided on May 8, 1953:

1. *Miscellaneous requests*
   a. Requests to have pupils excused for vacations, shopping, payment of bills, care of younger children, etc. shall be discouraged.
2. *Dental and medical appointments*
   a. Request to have pupils excused for dental and medical appointments shall be honored.
3. *Private music and dancing lessons*
   a. Pupils shall not be excused for private music and dancing lessons.
4. *Outside organizations and activities*
   a. Excuses for activities of this type shall be authorized at the discretion of the principal.

A policy of excusing children during school hours for dental appointments in one instance was formulated as early as September 1942 by the Kansas City Board of Education. This policy was developed, "In the interest of public health and made necessary by the war emergency." Apparently, it has worked well, since it is still in operation.

In reply to question 2 of the questionnaire, *does your board of education have specific forms for private medical or dental appointment service.*, of the 63 replies favoring the release of children for this purpose, 32 replied:

"No" or
"No regular form, a note usually suffices" or
"Some dentists and physicians have their own forms."

The remaining 31 enclosed a form that is currently used for this purpose. Figures #1 through #6 are representative samples of the 31 forms received.

APPLICATION FOR EXCUSAL FROM SCHOOL
FOR DENTAL APPOINTMENT

_____ has an appointment for necessary
(Name of Pupil)

dental service on _____, 19____ at ____ a.m. p.m. to approx. ____ a.m. p.m.

This service cannot be rendered satisfactorily outside of school hours. It will be appreciated, therefore, if this pupil is excused from school to keep the appointment indicated above.

The parent assumes full responsibility for the child's safe conduct during the time absent from school.

_____ _____
(Signature of Parent) *(Signature of Dentist)*

EXCUSAL APPROVED BY _____
(Signature of School Official)

_____ was in my office from ____ a.m. p.m. to ____ a.m. p.m. on
(Name of Pupil)

_____, 19____ for necessary professional services.

_____
(Signature of Dentist)

(This permit must be returned to teacher or principal after appointment.)

FIG. 1

Reverse side reads:

"The Board of Education of Chicago and the Chicago Dental Society are cooperating in a plan whereby public school children of Chicago may receive necessary dental care during school hours without being penalized for absence.

An application for excusal from school for such purpose, judiciously used, will enable school children to secure necessary dental care that cannot be rendered satisfactorily during the hours school is not in session.

This excusal form is approved by the Board of Education of Chicago and the Chicago Dental Society."

SEATTLE PUBLIC SCHOOLS
Dental Appointment

School _____ Date Issued _____

_____ has reported an appointment with

Dr. _____ at ____ a.m. p.m. _____, 19____

To be filled in by the dentist

This patient left the Dr's office at ____ a.m. p.m. _____, 19____

Dr. _____

Office Add _____ Tel. _____

To be filled in by the school

Returned to school at ____ a.m. p.m. _____, 19____

Principal _____

FIG. 2

PASADENA CITY SCHOOLS

Pasadena, California

DENTAL APPOINTMENT SERVICE

Excuse Slip

Date _____

Name _____

a pupil of _____ School

Arrived at _____
Time

and left at _____
Time

Signed _____ D.D.S.

Return to School

PASADENA CITY SCHOOLS

Pasadena, California

DENTAL APPOINTMENT SERVICE

Next Appointment

Name _____

Time _____ Day _____

Date of next appointment _____

Signed _____

Return to Dentist

FIG. 3

Reverse side reads:

To the Dentist:

This form completely filled out and signed by you is returned by the child, immediately, to the principal of his school. By this procedure only will full credit for the child's attendance be granted when computing average daily attendance, authorized by Section 4.769-5 of the School Code of the State of California.

Duluth Public Schools

Dental Health Department

Request for Excuse from School for Dental Treatment

To the Principal:

As it is impossible for me to take care of _____ s
Name

dental work outside of school hours, I hereby request that he-she be excused from class in time to keep an

appointment with me on _____ _____ _____
Day *Date* *Hours*

_____
Dentist

* * * * * * * * * * *

I approve of having _____ excused from class as outlined above.

_____
Parent's Name

Date _____ _____
Principal's Name

FIG. 4

APPLICATION FOR EXCUSE FROM SCHOOL FOR DENTAL APPOINTMENT

_____ of _____ School
(Name of Pupil

An appointment for necessary dental service has been made for this pupil

on_____ 19____ at_____ a.m. p.m.

This service cannot be satisfactorily rendered outside school hours.
Will you please excuse this pupil from school in order to keep the appointment indicated?

_____ 19____ _____
Signature of Dentist

Approved_____ 19____ _____
Signature of Parent

Approved_____ 19____ _____
Signature of Principal

_____ was in my office from_____
to_____ p.m. on_____ 19____ for professional servce.

_____
Signature of Dentist

FIG. 5

Reverse side reads:

The public schools are cooperating in a plan to make it possible for the children of Pennsylvania to obtain necessary dental service.

Uninterrupted school attendance is essential to the pupil's educational progress. It is requested, therefore, that application for excuse from school for such purposes be made only when dental services cannot be satisfactorily rendered during the hours when school is not in session.

SPRINGFIELD PUBLIC SCHOOLS

Springfield, Massachusetts

DENTAL PERMISSION FORM

Pupil's name_____
School _____
Appointment with Dr._____
Day _____ Date_____ Hour_____
Arrived at dentist's ofc_____ Left_____
Signature of dentist_____
The above pupil has permission to leave school at_____
Returned _____
Signature of principal_____

(over)

FIG. 6

Reverse side reads:

PROCEDURE FOR MAKING DENTAL APPOINTMENTS DURING SCHOOL HOURS

1. The pupil presents his dentist's appointment card at the principal's office.
2. The pupil secures this permission form signed by the principal.
3. The pupil presents his permission form to his dentist at the time of his appointment and secures his dentist's signature.
4. The pupil returns to school immediately following his appointment and returns his permission form to the principal.

In reply to question 3 of the questionnaire, *in the event of permitted absenteeism during the school day for health service, are provisions made for transporting the child to and from the private practitioner's office?*, of the 63 favorable replies, in only one instance was it reported that the Board of Education transported the child in order to receive private medical or dental care and then only when it was impossible for the parent; however many reported transporting children to clinics.

Question 3a. of the questionnaire states: *If not, does the board of education assume any responsibility for injury to a child on authorized absence for this purpose.* This question was inserted in order to determine whether or not valid argument existed against the release of children because of liability involvements thrown upon a Board of Education. Of the 63 Boards of Education permitting the release of children during school hours the replies were:

42, "No".
21, as follows:
"No responsibility assumed. Note of authorization is obtained before child leaves school grounds." Or,
"The Board of Education does not assume any responsibility for injury to a child in these cases. This is wholly the responsibility of the parent or guardian."

Question 4 of the questionnaire states, *is authorized absence from school for health service deemed an absence in computing average daily attendance in order to secure apportionment from state school funds?* This question, too, was inserted in order to determine whether or not valid objection to releasing children existed on the premise that such excusing from school would effect state school funds. Of the 63 replies received:

43 stated: "No loss in apportionments from state school funds."
13 replied: "No, only if the child is absent for more than half a school day.
7 replied, "Yes".

Several of the "Yes" replies were obvious errors in understanding the question since other indications, state law (e.g., California) or state department of education policy were to the contrary. However, one community specifically stated:

'Yes, children are counted absent." Another stated:
"Yes, a pupil is either actually present or absent at school."

In essence, the vast majority lose no funds from state sources with regards to this matter, provided the child first reports to school and is then dismissed or attends an early morning health appointment and then reports to school. In some states, state school funds are allocated on the basis of average membership and not on daily attendance.

In many instances where the child is absent all day, apportionments from state school funds are lost; however, it is unreasonable for a child to be absent for that length of time in order to receive private medical or dental care. It may be assumed that where policy to the contrary exists (that a child may not leave school during school hours) just such absences are occurring. In other

words, since the child may not leave school in order to keep a private appointment, he is kept out of school the entire day by his parent on the premise that he is not well.

It is interesting to note further that among the remaining 31 communities (16 reporting that children are "not permitted to leave school" and 15 reporting "sometimes") approximately the same proportion report that there is no loss from state funds if such absenteeism were permitted.

Finally, question 5 asks, *what objection, if any, can you see as an administrator in permitting a child to leave school during the school day in order to receive private medical or dental attention*, and question 6 leaves space for *remarks*. Replies to these two questions are grouped together since in most instances the administrator replying made no differentiation.

Of the 63 communities releasing children, these are the typical replies received to questions 5 and 6:

> "Our administration feels there is no objection if written request from parent is received."
>
> "None, it is just good common sense."
>
> "If the child were not permitted to go to the physician or dentist at the time appointment could be made, this service might be denied him."
>
> "From my experience of 20 years as principal of a junior high school, I found no serious objection in permitting the children to leave school during the school day to receive medical or dental attention."
>
> "A healthy child is more teachable. However, there is disruption in the classroom—work has to be made up. Just simple follow-up necessary on excuse for one child demands a lot of attention by the administrator. Frankly, I cannot see this as an objection as we believe the health of the child comes first."
>
> "Our entire program of school health has during the past 3 or 4 years been undergoing a process of evolution changing from a complete or nearly complete care program to one strictly of prevention and education. For example, we no longer provide dental care or inspections (physical examinations) or immunizations at school but have placed that responsibility where we feel it belongs, upon the parents. And if through our education programs we have urged parents and students to secure medical and dental attention from private practitioner, we must be consistent and excuse children for such appointments."
>
> "It is the feeling of the administration here that today's modern dentists and physicians do considerable health education in the time of these dental and medical appointments—at which time, the child is most receptive to learning, a time when he is actually experiencing something himself. Therefore, it is our feeling that more frequently than not the child may actually learn more—as well as get the needed medical or dental attention—in a physician's or dentist's office than he would have in the classroom."

Several replies to questions 5 and 6 make mention of the dangers of abuse to such a program by either the doctor, the child, or the parent and add that in addition there is a loss of education time to the child and some resulting confusion in the administration of such a program. For example:

> "Danger that both dentist and parents might take advantage of the privilege. We have had excellent co-operation here. It is understood that any abuse of this privilege will result in having it withdrawn."

"It is an encroachment upon the child's educational opportunities to accommodate the medical and dental profession."

"Disadvantage to teacher in that she must see that child is given help to make up the work lost. Extra clerical and teacher time required to check on time taken."

It is interesting to note the following remarks:

"Instances of abuse of the privilege seem to be unusual. Too frequent visits by any one pupil can usually be handled by direct contact by the school nurse with the particular physician or dentist."

"Under the present plan, which has been in operation since 1951, we have had little complaint that absences have been excessive."

"Generally speaking, our physicians and dentists follow the procedure very closely. The principals, parents, and medical and dental society are very happy with the present policy."

From amongst the 31 additional replies, those constituting the "No's" and "Sometimes" to the releasing of children during school hours, the following statements have been made in reply to questions 5 and 6:

"I can see no reason for permitted absenteeism during the school day (except in cases of extenuating circumstances). I believe that a policy to the contrary would constitute an invitation to the parents to view lightly the importance of regular school attendance."

"Schools are run for the benefit of children not for the convenience of parents. I am sure hours are available outside of school hours for private medical and dental attention."

"Private physicians and dentists, we feel would tend to fill in their less occupied hours in the morning and immediately after midday with children patients at the expense of the child's school time."

"We do not believe that a child's health status should be maintained at the expense of his education."

"If the child is a paying patient he should not be forced to sacrifice his school time any more than paying adult patients should be forced to sacrifice business hours except in emergency situations."

In general, it may be stated that the question of excusing school children for health service visits to a private physician or dentist has been given much thought by school administrators. Sufficient interest in this subject is apparently sustained since 75% of the questionnaires were answered and of these, 67% endorsed this practice.

For the immediate future, the policy of releasing school children in order to receive private dental care will have to be continued if the best interest of the child is to be served. But with the fluoridation of public water supplies and an attending ⅔ reduction in tooth decay, this policy in all probability will be altered. For that reason, boards of education, school administrators, teachers, parents and the community in general have a very definite stake in fluoridation.

COMMENTS

The purpose of this paper has been two-fold: one—to point out some of the factors that need to be considered in assaying the problem of excusing children

from school during school hours in order to receive private dental care, and two —to ascertain existing practices in boards of education nationally in this matter.

The dentist today is confronted with the problem of meeting the demands for dentistry for children—the needs amongst this age group being literally enormous.

The co-operation and assistance of the parents, educators and community in combating oral diseases is essential, for, in spite of all the modern techniques available, dental decay is advancing at a pace beyond the dentist's ability to meet. Dental decay is more rampant today than a decade ago and was more rampant then than a generation ago.

The only solution is prevention and early treatment—prevention through the fluoridation of public water supplies which can be achieved only through the co-operative efforts of parents, educators and community, and—early treatment through the understanding and co-operation of the parents, educators, and dentists. Though some school time must be given up in order for school-age children to receive dental care, educational experiences are still going on. To use the words of one superintendent of education:

> "... modern dentists and physicians do considerable health education at the time of these dental and medical appointments at which time the child is most receptive to learning, a time when he is actually experiencing something himself...."

In attempting to ascertain current practices, nationally, concerning the excusing of children during school hours in order to receive private dental care, questionnaires were mailed to all cities in the United States with populations of over 90,000 (1950 census). Of the 125 questionnaires, 94 replies were received and fully ⅔ of those reporting (63) authorized the practice of excusing children for this purpose. It is interesting to note that a high level of interest exists concerning this subject since 75% of the questionnaires were returned completed, many with an accompanying letter offering additional information.

It was learned that the State of California has specific legislation authorizing unlimited absenteeism for this purpose, while several states have formulated such a policy at the state level—worked out jointly between the state department of education and the state department of health. However, recommended policy at the state level favoring this action in some instances, apparently has little influence locally.

From the 63 replies, 23 boards of education have formal written policy permitting private dental care during school hours. Twelve of these are California cities. The remaining eleven:

Dearborn, Michigan	Sommerville, Massachusetts
Evansville, Indiana	Erie, Pennsylvania
Tacoma, Washington	Providence, Rhode Island
Toledo, Ohio	Kansas City, Missouri
Milwaukee, Wisconsin	Cleveland, Ohio
	Chicago, Illinois

have developed this formal policy (with two exceptions) since 1949, which demonstrates, in part, the growing recognition of the importance of good oral health.

It is rather contradictory that permitted absenteeism to attend clinics is both acceptable and desirable as pointed out in many replies. Yet, some of these same administrators oppose releasing a child in order to keep a private appointment. Massachusetts, in its joint policy formulated by the Massachusetts State Department of Education and the Massachusetts Department of Public Health, concluded:

> "Children who need medical or dental care and who by necessity must make appointments with private doctors or dentists during the regular school hours should be accorded the same privilege as that enjoyed by children who, with the approval of school authorities, attend clinics, i.e., excuse without absence."

The problem of excusing children during school hours is a many faceted one and no one solution is applicable to every community. Certainly, in considering this problem, thought should be given to the age of the child, the threshold of fatigue of the child, the DMF index of the community, the amount of "effective demand" for dentistry, the number of dentists practicing dentistry for children, the time, distance and transportation factors involved between the school and the private dentist's office, availability of dentists who are interested in children's dentistry, ratio of dentists to the general population and so on.

In the final analysis, the health and welfare of the child is of primary consideration. Only by the educator's understanding of the problems associated with dentistry for children and only by the dentist's understanding of the problems associated with educational interruptions can a solution be found that will work to the best advantage of the child.

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Some Laboratory Observations on the Chemical, Bacterial and Enzymatic Properties of Sodium N-Lauroyl Sarcosinate

M. W. Rosenthal, M.S., L. M. Marson, Ph.D., and A. Abriss, M.S.

DETERGENTS and wetting agents, in addition to their effect on surface tension, are known to demonstrate various degrees of anti-microbial activity. The most active of these are the cationic agents, usually based on a quaternary ammonium structure. These materials are true germicides but the mechanism of their action has not been clearly elucidated. Many theories have been advanced to explain their mode of action including enzyme-inhibiting effects, interference with organism electrical charges, penetration of the cell membrane, interference with membrane gaseous exchange or other mechanisms. The theory that surface activity alone is responsible no longer seems tenable. Both the nonionic and anionic agents usually show greater surface activity than the cationics but not as great a bactericidal effect. Epstein and co-workers were unable to find any marked relationship between quaternary detergency and bactericidal action.[1]

Bacteriostatic activity, however, is not a property of the cationics alone. Long chain alkyl aromatic sulfonates, secondary alkyl sulfates, sulfosuccinic acid derivatives and many others are all known to have some bactericidal or bacteriostatic properties.[2] Presumably the mode of action may be similar in some respects to the theoretical action for the cationics.

The potential number of molecular configurations which will give rise to compounds with surface depressant effects is, for all practical purposes, virtually unlimited. Investigations into useful synthetic molecules has been both extensive and fruitful in the last two or three decades and it is expected that many more extremely valuable contributions are yet to be made.

During the mid 1930's, German chemists synthesized and patented a series of anionic detergents based on the alkali salts of N-fatty acid amino acid condensates. These included the N-fatty acid derivatives of sarcosine, methyltaurine and other amino acid alkyl amides. The compounds, known as the "Medialans", were extensively used in Germany shortly after the time of development. Their use had been suggested not only as textile cleansing agents but also as foamers in toilet soaps, shampoos and toothpastes.[3, 4] Recent work has indicated that the N-lauroyl derivative of sarcosine may be effective in preventing enzymatic glycolysis in the tooth plaque and in reducing the caries rate in adult subjects.[5, 6]

Because of the possible importance of the sarcosine derivatives, we have studied sodium N-lauroyl sarcosinate in somewhat greater detail from chemical, bacteriological and enzymic aspects than has been previously reported.

CHEMISTRY

Sodium N-lauroyl sarcosinate is structurally

$$CH_3(CH_2)_{10}CON(CH_3)CH_2COONa$$

The compound can be synthesized by condensing lauroyl chloride with sodium sarcosine in the presence of a suitable catalyst. Purification is effected by recrystallization from alcohol or by acidifying with mineral acid and separating the free acid which can then be neutralized. The N-alkyl sarcosinates are true detergents and wetting agents, having excellent surface tension activity, high cleansing and foaming characteristics and emulsifying properties.

N-lauroyl sarcosinic acid, or its derivatives, exhibits the characteristic reactivity of organic carboxylic acids. It readily combines with potassium, calcium, ammonium, or other inorganic cations and also forms salts with free reactive amino groups.

ADSORPTIVE CAPACITY AND BACTERIOLOGICAL EFFECT

In the course of the investigations with sodium N-lauroyl sarcosinate, it was determined that the compound had a bacteriostatic effect against Lactobacillus acidophilus. This effect was noted when some freshly extracted human teeth were dipped in a dilute solution of sodium N-lauroyl sarcosinate, thoroughly rinsed with running water, and placed on tomato juice agar previously seeded with .05 ml. of a 24 hour broth culture of L. acidophilus. After 48 hour incubation at 37°, a pronounced zone of inhibition was found surrounding the teeth. This phenomenon appeared interesting for two reasons: 1) the bacterial inhibitory effect; and 2) the pronounced surface affinity which had resisted the flushing action of the rinse water. Table I demonstrates that this effect is noticeable in concentrations of sarcosinate as low as 0.5%.

Since it was possible that residual plaque on the teeth might have been responsible for this effect, several teeth were pumice scrubbed with a crescent bristle brush in the handpiece until all plaque and stain were removed. The results in Table II indicate that by the same technique, polished teeth have about the same adsorptive capacity for sodium N-lauroyl sarcosinate as unpolished teeth.

TABLE I

Zone of inhibition of test agar around human teeth rinsed in running water after immersion in sarcosinate solution

Sarcosinate Concentration Per Cent	Inhibitory Zone (mm.)
0.0	0
0.1	0
0.5	3
1.0	5
2.0	6
5.0	8
10.0	8
20.0	9

In another experiment, tricalcium phosphate and gastric mucin were separately exposed to the sarcosinate solution for two minutes. The centrifuged sediments were then rewashed by shaking and centrifuging in three changes of distilled water. These well-washed residues also had bacteriostatic properties. This characteristic adsorptive effect has subsequently been found in other substances, including keratin and cellulose.

TABLE II

Adsorptive bacteriological effect of a 2% sodium N-lauroyl sarcosinate solution on various materials

Substance	Zone of Inhibition (mm.)
Extracted human teeth	5.0
Pumice-scrubbed human teeth	4.5
Tricalcium Phosphate	5.0
Gastric Mucin	6.0
Cellulose (filter discs)	18.0
Keratin	1.0

TABLE III

Adsorptive bacteriological effect of sodium N-lauroyl sarcosinate in various concentrations on filter paper discs

Sodium N-Lauroyl Sarcosinate Concentration Per Cent	Zone of Inhibition (mm.)
0.001	0
0.005	0
0.01	3
0.05	7
0.1	8
0.2	9
0.5	11
1.0	18
5.0	19
10.0	17

Based on the adsorptive affinity for cellulose, the filter paper disc method used for antibiotic assays has been used in our laboratories to determine the biological activity of various N-lauroyl sarcosinate derivatives by themselves or in pharmaceutical formulations. The procedure entails dipping a disc in the test material, washing in distilled water, and then placing on the surface of a tomato-juice agar plate, previously seeded with .05 ml. of a 24 hour broth culture of L. Acidophilus. Table III shows the inhibitory zones around filter paper discs after immersion in sarcosinate solutions of increasing concentrations.

The sarcosinate has also been shown to have at least slight bacteriostatic effects against other commonly occurring organisms including Staphylococcus aureus, Streptococcus pyogenes, Bacterium ammoniagenes and Candida albicans.

ENZYMATIC CHARACTERISTICS

Sodium N-lauroyl sarcosinate has been classified as a glycolytic enzyme inhibitor because of its effect in preventing acid formation in tooth plaque and Snyder's Medium—saliva mixtures. Since the bacterial enzymes effect glycolysis, inhibition of acid production could result from either antienzymatic or antibacterial activity. In an attempt to differentiate between these possibilities, the effect of cell-free enzyme extracts has been studied. Using a Seitz-filtered, autolyzed yeast extract, a complete glycolytic degrading system was obtained and found to be inhibited by small quantities of sodium N-lauroyl sarcosinate. Corroborating results were obtained from a glucose-degrading enzyme system from muscle extract obtained by the method of Meyerhof.[7] Table IV demonstrates the inhibition of acid formation from glucose by sodium N-lauroyl sarcosinate.

The enzyme-inhibiting properties have also been studied in salivary sediment in vitro. 10 cc aliquots of pooled saliva were treated with 1 ml. each of various solutions under investigation. The mixtures were allowed to stand for 2 minutes and then centrifuged. The supernatant liquid was completely decanted from each tube and the sediment resuspended in distilled

TABLE IV

Inhibition by sodium N-lauroyl sarcosinate of enzymatic acid production in cell-free glycolytic enzyme systems

Sodium N-Lauroyl Sarcosinate Concentration (mg./100 ml.)	Acid Produced*	Per Cent Acid Production
A. Muscle Extract		
0	2.5	100%
3.3	1.8	72
20.0	0.6	24
200.0	0.1	4
B. Yeast Extract		
0	10.8	100
10.0	1.1	10
50.0	0.5	5

* Expressed as mg. lactic acid.

TABLE V

Glycolytic activity of salivary sediment after treatment with urea and sodium N-lauroyl sarcosinate

Sample	Solution Used	Am't	pH—Hours			
			0	1	2	3
1	Water	1 ml.	6.0	5.3	5.1	4.8
2	2% sodium N-lauroyl sarcosinate	1 ml.	6.5	6.4	6.3	6.3
3	13% urea	1 ml.	8.5	7.1	6.8	6.7
4	0.2% sodium N-lauroyl sarcosinate	1 ml.	6.1	5.4	5.2	5.2
5	1.3% urea	1 ml.	6.4	5.6	5.5	5.3
6	2% sodium N-lauroyl sarcosinate plus 13% urea	0.5 ml. of each	7.8	7.3	7.1	6.0
7	0.2% sodium N-lauroyl sarcosinate plus 1.3% urea	0.5 ml. of each	7.2	6.1	5.6	5.4

water. The tubes were recentrifuged and the residual salivary sediment suspended in 20 ml. of a 1 per cent glucose solution. pH readings were made immediately and at hourly intervals thereafter. Table V demonstrates that either sodium N-lauroyl sarcosinate or urea is adsorbed on (or diffuses into) the salivary sediment and exerts an anti-glycolytic effect despite the intermediate water wash. The combined activity (samples 6 and 7) exert a more pronounced effect than either material alone. It seems apparent that urease activity is responsible for the elevated pH in saliva samples treated with urea.

The cariostatic efficacy of the high-urea, ammoniated dentifrice has been demonstrated clinically in both children and adults.[8, 9, 10] Since the cariostatic effects of high-urea dentifrices depend, at least in part, on the enzymatic conversion of urea to ammonium carbonate by urease, any additive considered should not interfere with that action. Table VI indicates that sodium N-lauroyl sarcosinate does not interfere with the enzymatic formation of ammonia from urea even when the amount of sarcosinate exceeds the amount of urea in incubation mixtures. Differences in recovery are probably due to experimental error.

TABLE VI

Effect of sodium N-lauroyl sarcosinate on ammonia production from urea

Concentration Urea mg./100 ml.	Concentration Sodium N-Lauroyl Sarcosinate mg./100 ml.	Enzymatic Conversion Per Cent
87	0	92.2
150	7	88.5
80	40	90.0
59	150	86.5
59	300	87.6

The only enzyme occurring naturally in physiologically significant amounts in the mouth is ptyalin from saliva. Sodium N-lauroyl sarcosinate has been found to inhibit ptyalin activity but to no greater extent than other commonly used dentifrice detergents.

PROLONGED EFFECTIVENESS OF SODIUM N-LAUROYL SARCOSINATE IN SITU

Because of its enzyme inhibitory nature, its strong adsorptive capacity and its bacteriostatic effect on aciduric organisms, it could reasonably be anticipated that sodium N-lauroyl sarcosinate would effectively inhibit acid formation

TABLE VII

Lowest average pH reached after 50% sucrose rinse following the use of various dentifrices

Dentifrice	Average Minimum Plaque pH after 50% Sucrose Rinse				
	Hours After Single Dentifrice Use				
	2	4	6	12	24
High-urea	6.18	6.02	5.82	5.50	5.13
Sodium N-lauroyl sarcosinate	6.04	5.98	5.86	5.60	5.18
High-urea with sodium N-lauroyl sarcosinate	6.02	5.86	5.84	5.76	5.73

from sugars in the tooth plaque and on the tooth surface.

The measurement of pH in the dental plaque has been previously reported. Stephan showed that with an antimony electrode in situ, the drop in pH was directly proportional to the caries susceptibility of the subjects used and that local applications of high-urea concentrations would inhibit this acid formation for as long as 24 hours.[11, 12] Campaigne devised a method utilizing a micro-glass electrode and showed that there was rapid acid production in dental plaque after a sugar rinse.[13] Stralfors found that the pH minimum after a sugar rinse, as measured with the antimony electrode, was related to Lactobacillus counts. He also reported that the buffer capacity of dental plaque and salivary sediment were very much alike.[14, 15]

Using a modification of the Stephan method, plaque pH's have been measured in situ after a 50 per cent sucrose rinse on the lingual surfaces of the mandibular second molars close to the gingival margin in six volunteer adult subjects. Successive measurements were made as closely as possible within the same area.

These measurements were made at 5 minute intervals for 20 minutes after

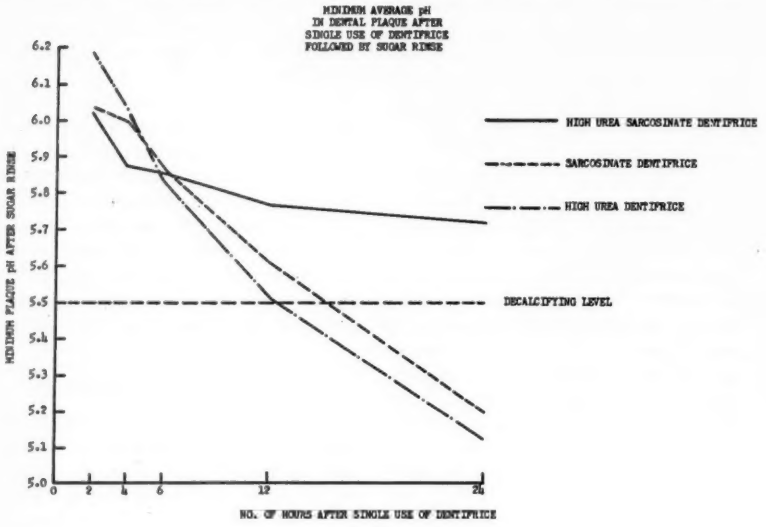

FIG. 1

the sugar rinses and were repeated at 2, 4, 6, 12 and 24 hours after the single use of various dentifrices. Table VII and Figure I indicate that either a high-urea dentifrice or a sodium N-lauroyl sarcosinate dentifrice will maintain the average minimum plaque pH above the decalcifying level of 5.5 for about 12 hours while the high-urea ammoniated formula with sarcosinate maintains the plaque pH above this level for 24 hours. All subjects experienced a greater reduction in plaque pH at the 24 hour level with either the high urea or sarcosinate dentifrices than with the dentifrice formulated with both ingredients.

CARIES REDUCTION IN HAMSTERS

A preliminary investigation has been carried on in hamsters to ascertain the potential cariostatic efficacy of toothbrushing alone and of toothbrushing with a high-urea ammoniated dentifrice containing sodium N-lauroyl sarcosinate. Weanling hamsters, from mothers fed a cariogenic diet during gestation, were placed on the Keyes cariogenic diet ad libitum at the age of 21 days.[16] 72 animals were split into three groups of 12 males and 12 females each. One group of 24 animals who were handled daily but did not have their teeth brushed, served as the control. A second group was brushed with a cosmetic dentifrice, purchased on the open market, while the third group was brushed with the high-urea sarcosinate test dentifrice. Laboratory workers brushed the hamsters' teeth once daily for one minute through a five day week. Clipped mascara brushes were used for toothbrushing.

The animals were sacrificed at the end of five months and the teeth scored by the Keyes method as modified by Johansen.[17] This technique had been developed for use with live animals but serves admirably for stripped jaws. Table VIII demonstrates that the high-urea-sarcosinate test dentifrice brought about a caries reduction of about 90 per cent in test animals of both sexes. No reasonable explanation can be offered for the apparent caries increment after the use of the cosmetic dentifrice.

DISCUSSION

Many agents have been investigated in recent years as dentifrice additives for the purpose of reducing dental caries. A partial list includes ammonium hydroxide,[18] dibasic ammonium phosphate alone,[19] high urea alone,[20] a combination of dibasic ammonium phosphate and urea in low concentration,[21, 28] a combination of dibasic ammonium phosphate and urea in high concentration,[8, 9, 10] urea in moderate concentration with the enzyme urease,[22] pencillin,[23] water

TABLE VIII

Preliminary observations on the cariostatic efficacy of a high-urea ammoniated dentifrice with sodium N-lauroyl sarcosinate in Syrian hamsters

Dentifrice	C.S.* Male	Per Cent Difference	C.S.* Female	Per Cent Difference	C.S.* Total	Per Cent Difference
None	6.43	—	9.96	—	8.19	—
Cosmetic	13.71	+113.2%	13.65	+37.0%	13.67	+66.9%
Test†	1.10	−82.9%	0.73	−92.7%	0.91	−88.9%

* C.S.—Average caries score.

† High-urea ammoniated with sodium N-lauroyl sarcosinate.

soluble chlorophyllins,[24] menadione derivatives,[25] fluorine compounds,[26, 27] glycolytic enzyme-inhibitors,[5, 6] and others. The value of some of these agents is still a matter of controversy. Many of the suggested therapies have not received sufficient attention in controlled clinical studies to afford a positive evaluation of their merit. Others have shown promising in vitro or animal results but clinical assessment has yielded doubtful or negative results. Of the above list, a survey of the literature indicates that only the combination of dibasic ammonium phosphate and urea in high concentration has had reports of confirmed clinical efficacy by independent investigators. Nevertheless, it can reasonably be expected that the theory of dental caries prevention by means of locally applied measures will continue to receive a great deal of attention in the future. The ease of administration makes such an approach an attractive one for both the dentist and patient.

Sodium N-lauroyl sarcosinate appears to meet the qualifications for a dentifrice additive for the purpose. Its high adsorptive capacity for both dental plaque and the clean tooth surface, where it exerts prolonged bacteriostatic and glycolytic enzyme-inhibitory effects, offers considerable promise for further clinical study. The compound has additional merit, aside from its therapeutic possibilities, as a high-foaming and cleansing dentifrice detergent.

It is interesting to note from the studies reported here that there appears to be a correlation between in vitro characteristics and biological effects. The bacteriostatic properties, adsorptive characteristics and glycolytic enzyme-inhibitory effects are laboratory measurements of academic interest. However, when these properties are considered along with the capacity of the agent to inhibit glycolysis in the dental plaque in situ and its effect in reducing the caries increment in animals, the theoretical mechanism offers promise as a cariostatic agent. It should also be noted, in the consideration of therapeutic agents, that there appears to be a distinct possibility of creating therapeutic additives. The high-urea, ammoniated dentifrice has been previously shown to have cariostatic efficacy. In situ, this type of dentifrice effectively inhibits plaque glycolysis to a pH of 5.5 or below for about 12 hours. In the presence of sodium N-lauroyl sarcosinate, however, the duration of effect seems to be doubled. If the acidogenic theory is considered of prime importance in the formation of the carious lesion, the additive or synergistic effect would assume great practical significance.

It cannot be too strongly emphasized, despite the encouraging preliminary results, that in the ultimate analysis all proposed therapeutics measures must be subjected to carefully controlled clinical investigation in human subjects with both clinical and x-ray evaluations used. Sodium N-lauroyl sarcosinate, on the basis of preliminary observations, appears to merit such consideration. A preliminary clinical report on its efficacy in a cosmetic base dentifrice has yielded encouraging results.[6] Further study in the same program may yield vital information.

SUMMARY AND CONCLUSIONS

Sodium N-lauroyl sarcosinate is an effective detergent with excellent foaming and cleansing characteristics. The compound has a strong adsorptive affinity for a number of materials and after adsorption exerts a direct bacteriostatic effect and inhibits glycolytic enzymes. In situ, it inhibits acid production in the dental plaque for prolonged

periods, which inhibition is enhanced by incorporating the material into a high-urea ammoniated dentifrice. The compound does not inhibit urease activity. A high-urea ammoniated dentifrice with sodium N-lauroyl sarcosinate effects a caries reduction of about 90 per cent in Syrian hamsters.

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